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JULY
1960

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SEE PAGE 19

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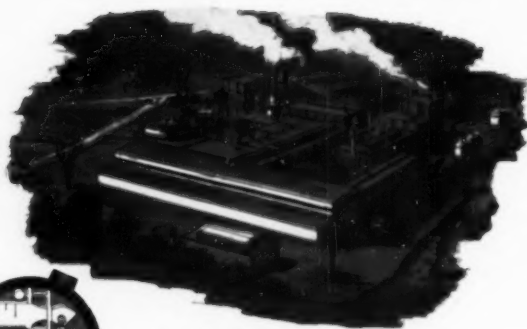
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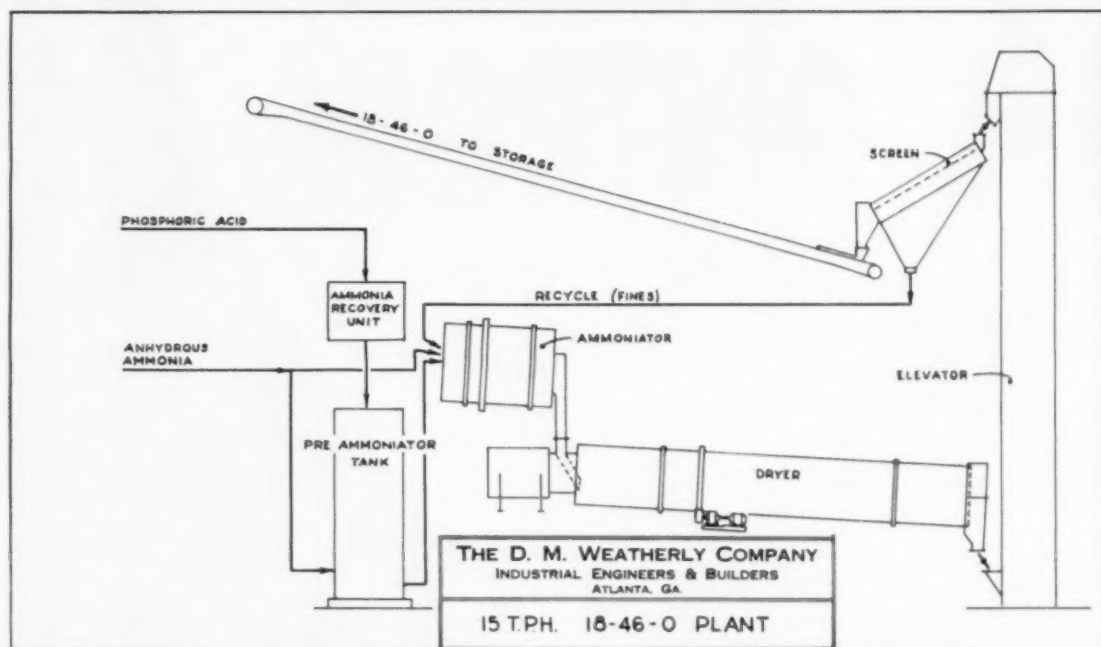
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Commenting **F**reely

by BRUCE MORAN

An interesting divergence of thought on research has crossed our desks this month. Speaking in Mexico, Dow Chemical's Carl Gerstacker expressed fears for the future of research because of rising costs and static chemical prices. He pointed out that the index of chemical prices is sitting right where it was in 1951. And, of course, costs, taxes and manpower have all gone up meanwhile.

On the other hand, reports from Austria, quoted this month in our International Scene de-

partment, say that recent experience there proves that, despite conditions, technical development can keep output rising nicely in the chemical industries, despite the market situation.

Conditions in Austria are, of course, quite different than in the U.S. But there as here, and everywhere, the future of the race, as well as the future of industry demands what Mr. Gerstacker has called "defensive research."

We must find ways and means to solve the dilemma—and we will, surely!

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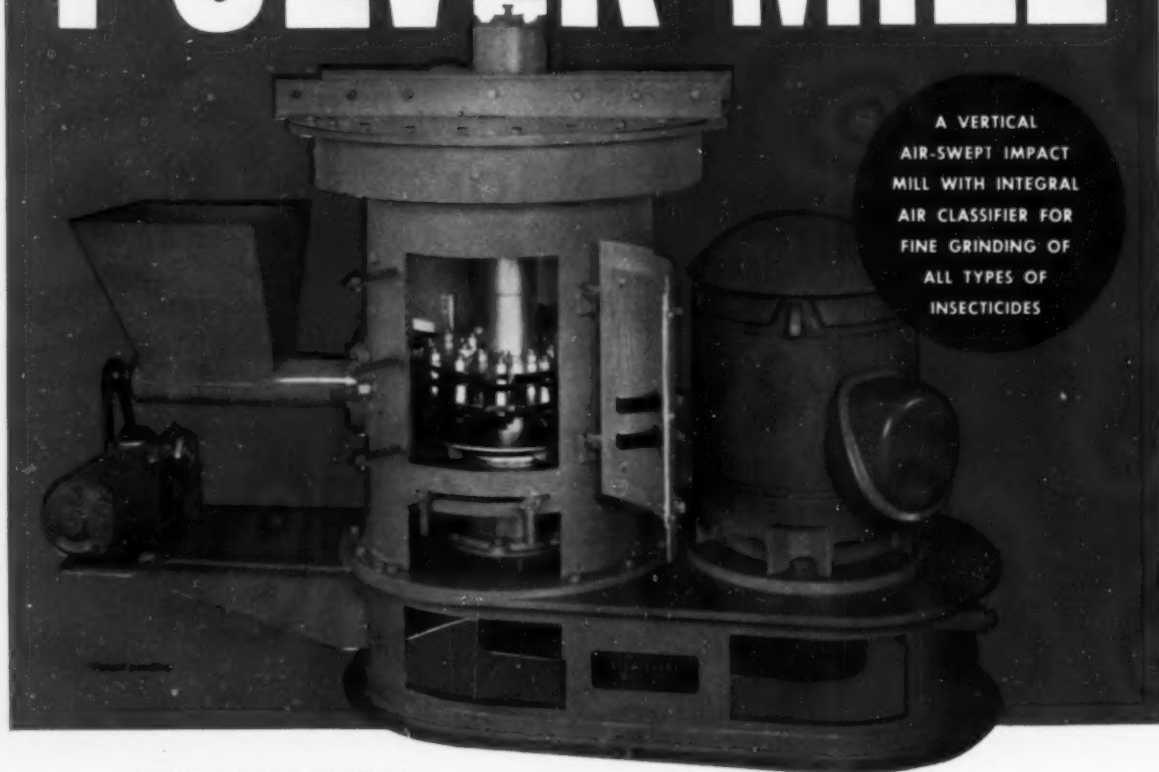
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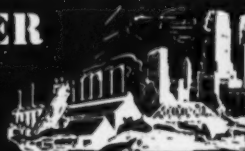
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JUST AROUND THE CORNER

By Vernon Mount



SIX MONTHS GONE, what is the status of the first of the "sizzling Sixties"? Pretty darn good, by all accounts. The stock market has its dizzy periods, but these do not reflect the general feeling of business and industry.

CONFIDENCE, as expressed by investment in new plants and equipment, is very high. The predictions are not as flamboyant as they were a while back, at year's beginning. But they are sound and sensible predictions.

NO BOOM, but no bust either is a quick way to say it, unless you prefer the summation made by DuPont's David Dawson in a recent speech. He calls them the "Competitive Sixties" and that is perhaps the best statement of actual conditions we have seen.

AS THE BOXERS SAY: "It was a tough fight, Mom, but we win!"

Yours faithfully,

Vernon Mount



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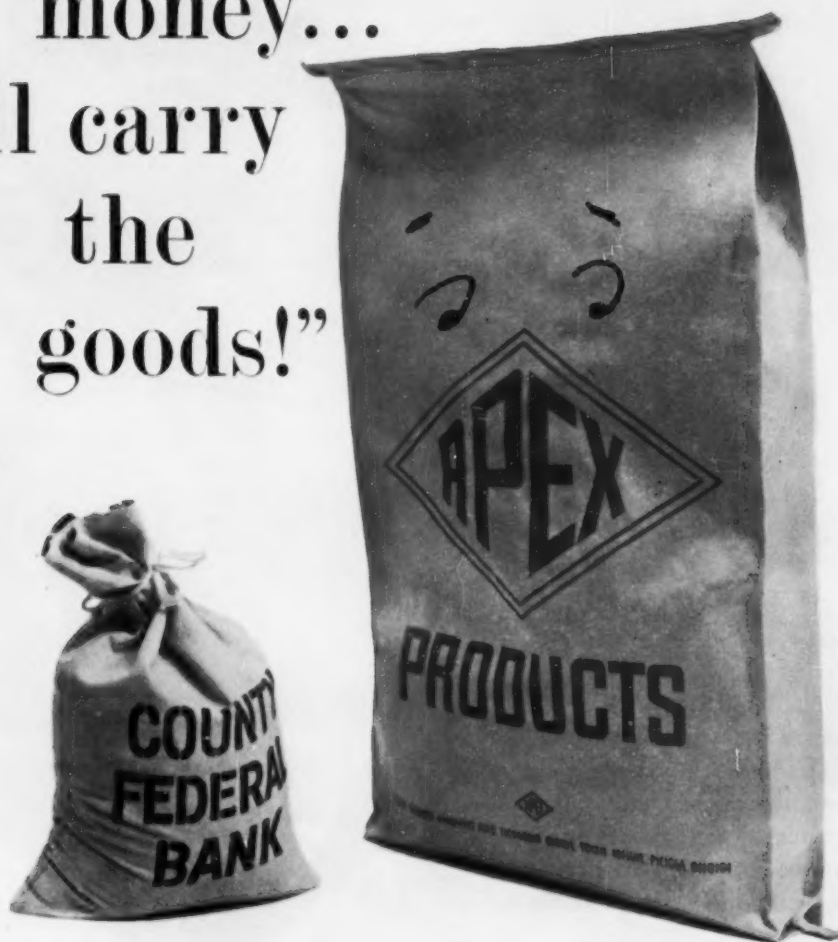
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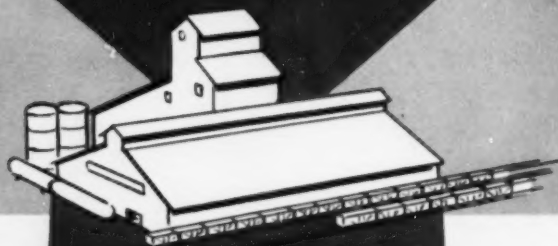
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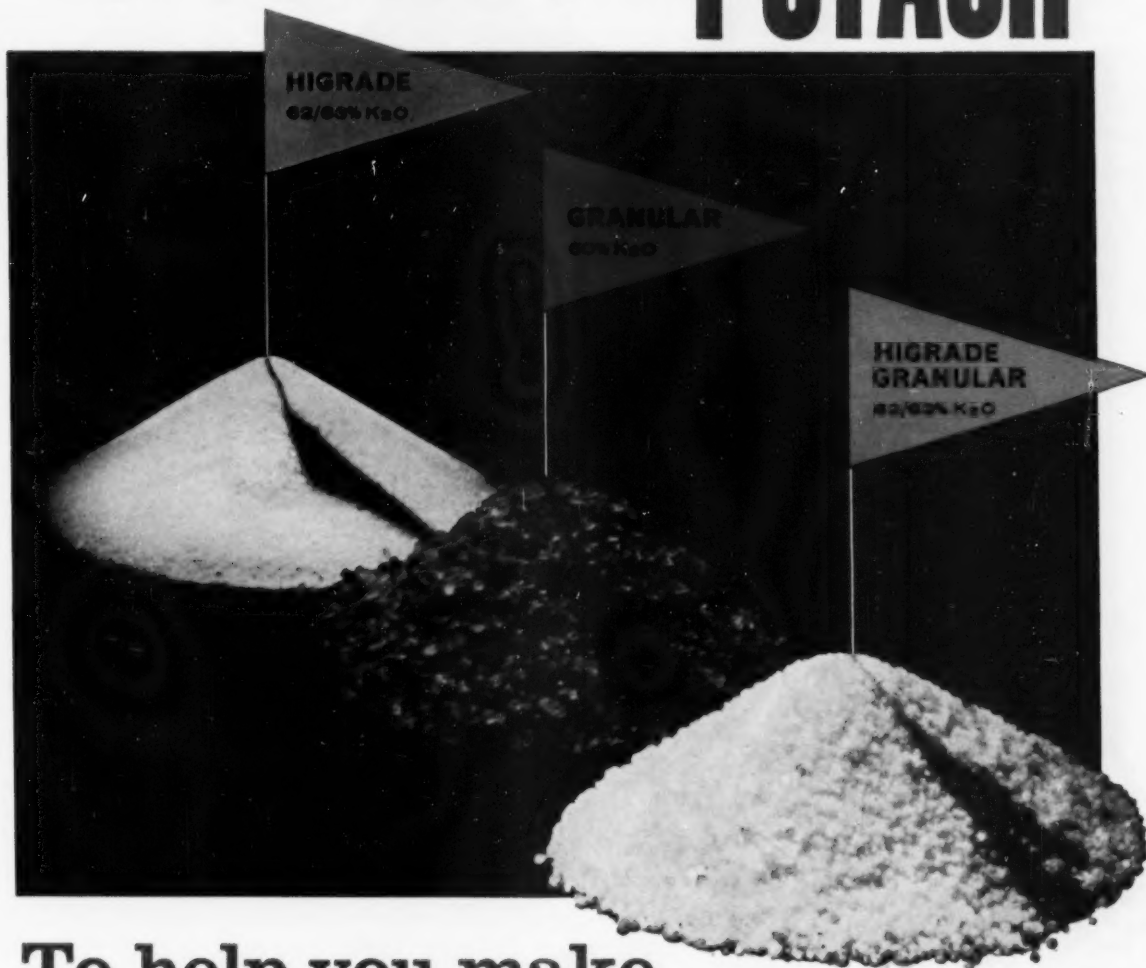
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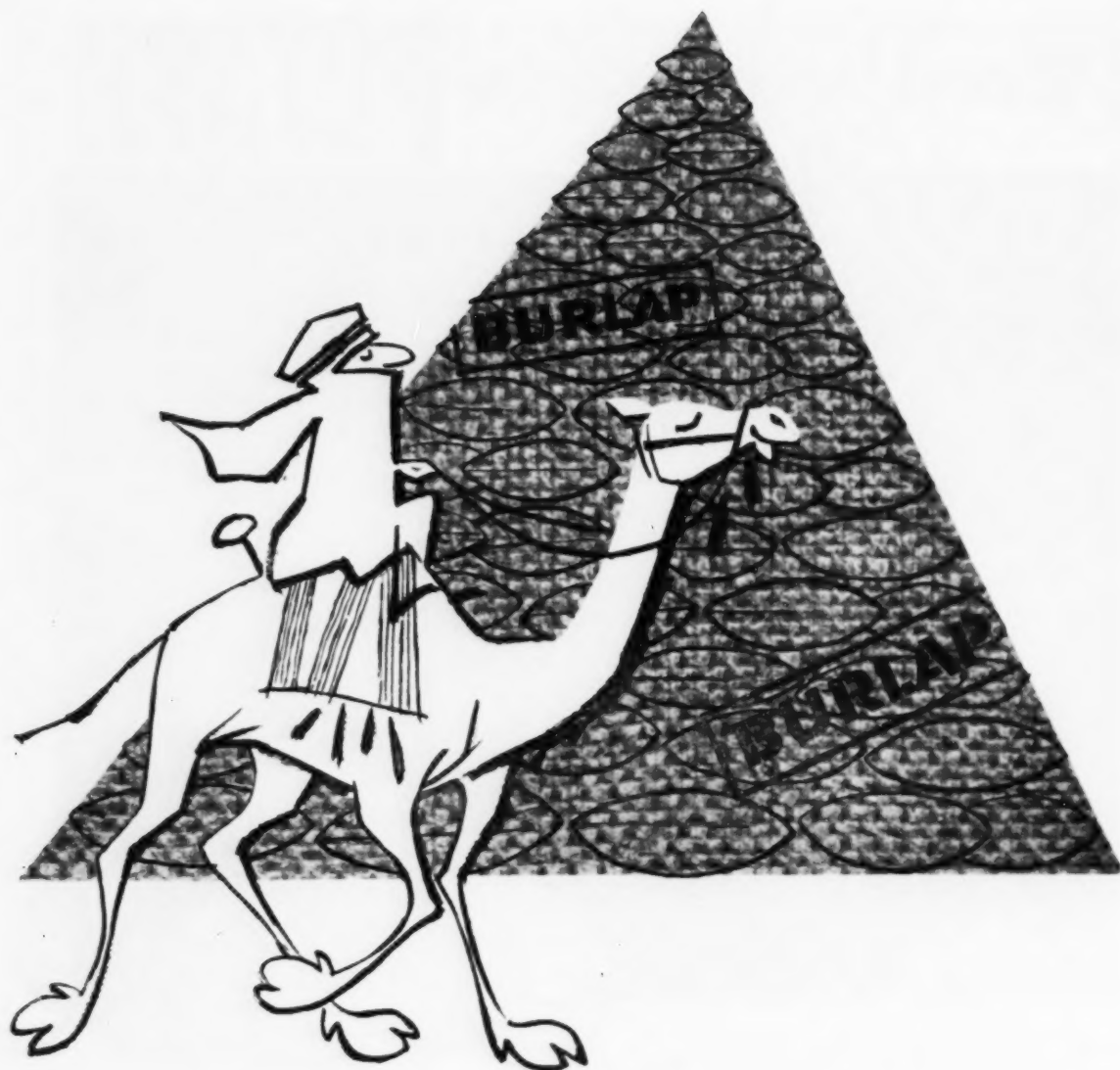
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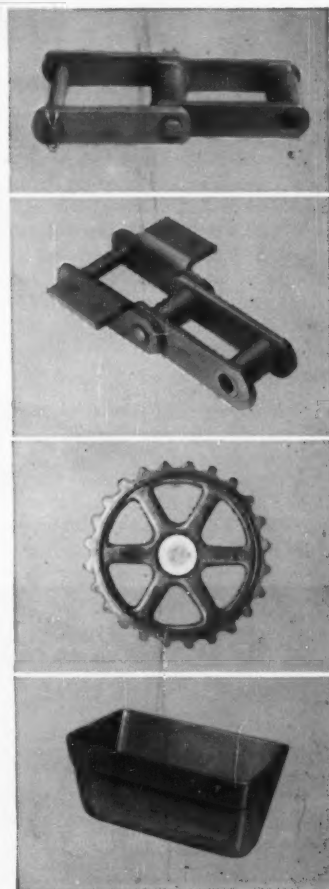
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Arcadian® News

Volume 5

For Manufacturers of Mixed Fertilizers

Number 7

Technical Tips to Help You Save Money

Efficient Ammoniation Puts More N in N-P-K

Production of high-analysis, high-nitrogen mixed fertilizer becomes most economical when all the superphosphate in the mix is ammoniated at the highest practical rate of ammoniation. With ARCADIAN® Nitrogen Solutions, most standard production procedures can easily be adapted to use about 6 pounds of ammonia per unit of finely divided 20% superphosphate, and from 3 to 3.5 pounds of ammonia for triple superphosphate. Keep in mind that one pound of ammonia will neutralize 3.71 pounds of 60°Be (77.67%) or 3.09 pounds of 66°Be (93.19%) sulfuric acid. Of course the very best production performances that yield absolutely maximum benefits may slightly exceed the above ammonia to superphosphate ratios.

Sulfuric Acid gives Higher Heat

In producing pulverized, semi-granulated and granulated fertilizer, it is often desirable to obtain higher temperatures in the mixer than would normally result from getting maximum ammoniation of superphosphate. The usual way to obtain this higher heat is through introduction of sulfuric acid. Indeed, the very high affinity of ammonia for acids assures this heat build-up before much of the ammonia has had a chance to react with the superphosphate. For example, a pound of ammonia reacted with sulfuric acid will generate about 2940 BTU's of heat in contrast to 1540

BTU's from reaction with triple superphosphate alone, and only 1460 BTU's with 20% superphosphate.

But this Heat is Costly

However, too many operators are prone to build up mixer heat with sulfuric acid without regard to the higher cost involved. Before embarking on a long-range program with sulfuric acid it would be wise to explore all other possibilities for getting the same result, such as better performance in the dryer. This alternative becomes even more attractive when you consider that heat produced by the chemical action of sulfuric acid *may cost 5 to 10 times as much* as dryer-produced heat by means of common fuels such as oil or gas.

Look to Your Procedures

Experience has shown that where equipment and techniques fail to perform in accordance with indicated levels, it is not usually the chemistry and mathematics that are at fault but something in the process itself.

For example, frequent cause of failure to derive the most economical results from ammoniating solutions is the formation of pellets, or large plastic masses, before all of the ammonia has been added to the mix. This reduces the surface area exposed to ammoniation, as well as enclosing some superphosphate, and conceivably acid, within the larger pellets

—beyond reach of the ammonia. This leads to wasteful use of acid and loss of nitrogen—whether it occurs in granulated or pulverized fertilizer, in batch or continuous mixer.

Another cause of failure is the indiscriminate use of excess amounts of acid. This can result in loss of nitrogen even though the original intention was to retain a higher portion of the ammonia input.

Four Things to Watch

Number one is proper introduction of nitrogen solution to assure intimate contact between superphosphate particles and the ammonia. It has become axiomatic in the industry that best ammoniation results are impossible without this all-important contact. It has also been found that operators cannot count on reclaiming much of the ammonia if it has not made proper initial contact with the superphosphate.

The second thing to watch in your procedure is your introduction of sulfuric and phosphoric acids. Too many producers are not fully aware of the importance of distributing these acids thoroughly throughout the mass at the time of ammoniation. The fact is, that if ammonia is applied in small areas of the mix at excess rates, some ammonia is bound to escape, particularly at the

(continued on following page)

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higher rates of ammoniation where volatilization occurs quite rapidly.

Thirdly, keep an eye on overloads in continuous ammoniating systems. Overloading in tons per hour per foot of ammoniating distributor pipe is quite common with continuous ammoniating systems. Serious enough in itself, the problem assumes even greater proportions when recycle is taken into account. In view of this, any remedial suggestion that may shorten the effective ammoniating region will naturally be resisted by the experienced operator. However, where this overloading is causing premature granulation which seriously affects the product, it is well worth trying to apply the acid in the continuous mixer a little ahead of the final portion of ammonia. Another approach to solving overload problems is to increase recycle wherever it is not already excessive. Or the use of 66% Be sulfuric acid may be advisable. Again, reduction of hold-up time in the mixer during ammoniation can also be tried, where practical.

The fourth item to watch is the operation of distributor pipes. If improperly designed, or if some parts are badly worn or corroded, excessively large volumes of solution, acid, water or steam may be introduced into small areas of the mix. This always means trouble.

Batch Mix Remedies Simpler

While the principles of good ammoniation remain the same with rotary batch mixers, avoiding and correcting problems is much simpler. It is relatively easy to design distributor pipes for the job at hand. And it's equally simple to make daily pipe inspections. In addition, the timing of introduction of acid (when used) and ammoniating solution can be regulated to a fine point—ranging from simultaneous to any desired delay interval.

Where the formation of undesired pellets becomes a problem in rotary batch mixers, keeping the flights clean to assure rapid discharge invariably helps. Avoid any dripping of liquids after valves have been closed. Be sure that all acid is in the mass and well distributed before all of the ammonia is applied.

If you need information specific to an ammoniation problem in your plant. Nitrogen Division technical men will be only too happy to help. Contact: Technical Service, Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.



Tissue tests show the farmer he needs more and better fertilizer.

Using Tissue Tests to Sell Fertilizer

Crops must have an adequate supply of needed nutrients *within the plant* to make vigorous growth and produce high yields. The best way to prove that yields are limited by plant food hunger is to test the nutrient content of the plants. This can be done efficiently and economically by on-the-spot tissue tests.

When you show a farmer, by tissue tests in his field, that his plants are deficient in certain nutrients, you present an excellent case for the use of more and better fertilizer. Tissue testing *now* can help you sell a bigger tonnage of better fertilizers for future crops—fertilizers that are more profitable to you and to farmers.

Tests Reveal Facts

Tissue tests graphically portray the fertilizer needs of crops. In a Missouri survey, tissue tests in 125 corn fields showed that 58% of the fields were deficient in nitrogen, 30% were deficient in phosphorus, and 26% were deficient in potash.

Tissue tests reveal the true reason for low yields. Last spring, some North Carolina farmers complained about the

poor performance of nitrogen on small grains. Tests showed that this was due to a lack of potassium and magnesium. The farmers were depending on carry-over from previous row crop fertilization to supply phosphorus and potash requirements. In only one instance out of 20 to 30 cases had a complete fertilizer been applied to the grain at planting time.

Summer Selling

Many fertilizer salesmen have discovered the fact that tissue tests are real salesmakers! The first day one salesman used a tissue test kit, he sold an additional 30 tons of nitrogen. His tests proved that a 2-1-1 ratio would have been a better ratio to use in the corn field he visited.

Tissue testing is a profit-producing job for your salesmen during the slack season in July and August. This is the right time to test most crops for plant food deficiencies. On-the-spot tests made now in farmers' fields will show them the plant food needs of their crops. Tests are scientific and believable. The right

fertilizer for the crop ceases to be a matter of personal opinion. The farmer can see what is needed by the results of the test. When he sees what is needed, he is ripe and ready to place an order and he is grateful to your salesman for making the test.

Where to get Test Kits

It will pay you to equip your salesmen with tissue test kits and get them out into the field making tests and making sales. Of course they should learn how to make tests before they start. They can study directions and try it a few times...and get the advice of an agronomist. Tissue test kits can be obtained from: Tissue and Soil Test Kits, Department of Agronomy, Purdue University, Lafayette, Ind.; or Denham Laboratory, Denham Springs, La.; or Urbana Laboratories, Urbana, Ill.

Write Nitrogen Division

If irrigation is used in your area, tissue tests are a valuable aid in selling fertilizer for use in irrigation water. Write to Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y., and ask for as many copies as you need of "How to Apply Fertilizer in Irrigation Water." These will be sent to you without charge or obligation. You can also ask any Nitrogen Division agronomist for some pointers on the use of tissue tests on both irrigated and non-irrigated crops.

Pre-reactor Process Popular in Midwest

The new pre-reactor process for producing high-analysis, high-nitrogen mixed fertilizers is rapidly gaining in popularity among manufacturers in the Midwest. They are using this process to meet the growing demand for high-nitrogen fertilizers for corn and other crops.

The use of 2-1-1 and 3-2-2 ratios is increasing. Probably the biggest gain this year will be in consumption of 16-8-8 and 15-10-10. Not many years ago, it was difficult to produce 2-1-1 and 3-2-2 ratios. But, new developments in methods and materials have made high-analysis ratios easy to manufacture.

This is the first full season that some Midwest manufacturers have used the pre-reactor process. Results have been

Practically all our large-acreage crops except legumes need more nitrogen than any other plant food. That is the economic reason why use of nitrogen has increased faster in the last 15 years than use of phosphorus, potash or other plant foods.

You can sell more nitrogen, and get more for it, by pushing high-nitrogen mixed fertilizers such as 15-10-10, 16-8-8, 14-7-7 and 12-6-6. You'll get the entire sale in one deal when you supply all the major plant food needs of the crop in one package. And in the long run too, you'll gain good will because you are providing what farmers really need—balance in plant food application.

Saves Farm Work

When farmers apply fertilizer that provides N, P and K in the right balance for their crop, they can't forget to do the job right. Every year, somewhere, an important acreage of farm crops does not get the nitrogen side-dressing or top-dressing needed to make the crops do

phenomenal. Manufacturers are now able to produce high-analysis, high-nitrogen fertilizers with the same ease and confidence with which they made low-nitrogen fertilizers in the past.

Ask Nitrogen Division

The pre-reactor process enables you to produce high-nitrogen fertilizers with all the nitrogen derived at low cost from ARCADIAN® Nitrogen Solutions. It also offers many other outstanding advantages. The cost of adding a pre-reactor system to a complete granulating plant is surprisingly low. It will pay you to get all the facts. Contact Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

It Pays to Sell More N in N-P-K

their best. Bad weather and the rush of other work prevent getting the job done. Sell high-nitrogen mixed fertilizers and you protect farmers from this constant problem, and put more profit in your own pocket.

N for Cash Crops

Corn, wheat, cotton, sugar beets, most vegetables and fruits—by far the majority of cash crops—need more nitrogen than other plant food. Now that high-nitrogen mixed fertilizers are so concentrated, farmers can apply all the fertilizer needed for high yields in one or two applications, pre-plant or in the planter. The new-style planters that place the fertilizer to one side and deeper than the seed make it easy to use large amounts of fertilizer in the row without seed damage.

Feed Crops Too

About 80 percent of all our harvested crop acreage goes into livestock feeds. These fields, along with millions of acres of unplowed range and pasture, make livestock feed the biggest crop market by far.

Most hay silage and grazing crops need high-nitrogen mixed fertilizer in 2-1-1 or even 3-1-1 ratio to produce the largest amounts of high-quality feed, containing the most protein and other digestible nutrients. You do livestock farmers a favor by selling high-nitrogen balanced fertilizer for top-dressing.

Better Feed Value

Grain crops, too, are largely used for feed. Results on many farms show that corn, wheat, barley, oats and milo all need more nitrogen than any other plant food to produce big yields. The high-nitrogen fertilizer also increases the protein content of many grains, and thus increases the feed value of the crop two ways.

Many crops still don't get enough fertilizer of any kind. It is easier to show skeptical farmers the profits fertilizer can make for them if you sell them fertilizers balanced to the needs of their crops. When you sell more N in N-P-K you put more profits in the bag for the farmer...and for yourself.

HERE'S THE BIG LINE OF

Arcadian

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES			
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. in. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE MANOVER 2-7300



Hopewell, Va., P. O. Drawer 131 Glenview 8-6301
 Ironton, Ohio, P. O. Box 98 Drexel 7-4366
 Omaha 7, Neb., P. O. Box 166 Bellevue 1464
 Raleigh, N. C., 606 Capital Club Bldg. Temple 3-2801

Columbia 1, S. C., 1203 Gervais St. Alpine 3-6676
 Atlanta 3, Ga., 127 Peachtree St., N. E. Jackson 2-7805
 Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
 Columbia, Mo., 1134 Highway 40W Gibson 2-4040

Indianapolis 20, Ind., 6060 College Ave. Clifford 5-5443
 Kalamazoo, Mich., P. O. Box 869 Kalamazoo 5-8676
 St. Paul 14, Minn., 764 Vandalia St. Midway 5-9141
 San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840



An American Cyanamid Company metallurgist runs flotation test on prospector's sample, a key step in evaluating worth of phosphate deposits.

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*Like all the men and women in Cyanamid's phosphate operation,
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She's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into the kind of products and services you can use. Take advantage of both. Pick up your phone and call your Cyanamid representative.

Services you can use

Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money and can make your oper-

ation run even more efficiently.

Technical Service: Cyanamid's staff of technical experts are on 24-hour alert. Often, what are new problems to you are solved problems to them. Make your formulation and production problems theirs. That's their job.

Sales Service: Cyanamid sales representatives are available to work with and for you in expanding present markets or in establishing new markets.

Products that serve: Cyanamid's only phosphate business is mining and manufacturing the highest quality products for your mixed fertilizer requirements.

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- TREBO-PHOS® — Triple Superphosphate

- Phosphoric acid for acidulation

To manufacture fertilizers that sell... mix with Cyanamid's phosphates and service.

American Cyanamid Company, Agricultural Division, N. Y. 20, N. Y. *TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.



NPFI convention



NPFI EXECUTIVES

Key executives of National Plant Food Institute, elected at the annual convention by the board of directors, are shown here (left to right): Paul T. Truitt, president (reelected); John W. Hall, vice chairman of the NPFI board, and president of Potash Company of America, Denver; and Jefferson D. Stewart, Jr., chairman of NPFI's board, and president of Federal Chemical Company, Louisville, Ky. Other officers reelected are: W. R. Allstetter, vice president; Louis H. Wilson, secretary and director of information; and William S. Ritnour, treasurer.

Some 800 representatives of the fertilizer industry and its suppliers gathered at White Sulphur Springs, W. Va. June 12-15 for National Plant Food Institute's fifth annual convention. While registration was a shade under last year's, attendance at — and interest in — the business sessions seemed more marked than in past years.

The program achieved a nice balance between education and recreation. On the recreational side were the usual golf, tennis, skeet-shooting and horseshoe-pitching, along with two hospitality hours—hosted by the

WEIGHS business' responsibility in Government

LOOKS AT Distribution methods and problems

nitrogen and potash producers — a country party and the annual banquet. Afternoon thundershowers forced the hospitality hours indoors and disrupted sporting activities, but most events came off as scheduled.

The business meetings moved along smoothly, and centered themselves around two general areas of interest. As NPFI board chairman Richard E. Bennett explained in his welcoming address, the sessions were planned around the 'status of business in relation to the political economy' and around the 'problem of distribution.' Mr. Bennett said that amid the clamor of many powerful voices, it is often hard for the business community to be heard by government, and that one value of a strong trade association is that it provides the necessary strength and influence to protect private, competitive enterprise against forces inconsistent with the principles and protection offered under our competitive system.

Dr. Clifford M. Hardin, chancellor of the University of Nebraska and president of the American Association of Land-Grant Colleges and State Universities, told the audience that "we must continue to strive to

improve the efficiency of agricultural production" because the problems of agriculture will never be solved through less efficiency."

"In very real terms," he continued, "the development of American agriculture is a success story. Some seem to feel that it is too much of a success story because we have surpluses of certain farm commodities and that the time has come to declare a moratorium on some of our research activities. I happen to be one who believes that such a policy of slow-down and stoppage would be most unwise. Programs of education and research simply do not lend themselves to fits and starts and interruptions. Furthermore, I do not believe our combined agricultural research and education program is the basic cause of our surplus problem. I am inclined to believe that the problem arises essentially through the nature of the farm enterprise itself. I do not believe that America will ever solve any problem by deliberately promoting inefficiency or by trying to dam up and seal off the human desire to progress and make life better."

Dr. Hardin said that "the future of our agricultural development in the

AFTERNOON PANEL DISCUSSIONS

Participants in afternoon panel discussions (left to right): Stacy B. Randle, New Jersey state chemist and president of Association of American Fertilizer Control Officials; Dale C. Kieffer, Smith-Douglass

Co.; Edwin M. Glocker, W. R. Grace & Co.; moderator Vincent Sauchelli, National Plant Food Institute; J. R. Archer, International Minerals & Chemical Corp.; C. H. Russell, Monsanto Chemical Company; and Albert Spillman, Fertilizer Manufacturing Cooperative.



Commercial Fertilizer Staff Pictures from National Plant Food Institute Convention

1. Zenas Beers, NPFI, Chicago; Raoul Alstetter, NPFI, Washington; Morris Newman, Federal Chemical Co., Louisville; and Ted Bacon, Raymond Bag Corp., New York.

2. Woody Wilson, Chicago, and Ed Kapusta, New York, both with U. S. Borax & Chemical Corp.; Mr. & Mrs. Phil Stocker, Land O' Lakes Creameries, Minneapolis; G. W. Kraemer, International Minerals & Chemical Corp., Minneapolis.

3. Bill Lehmann, Chilean Nitrate Sales Corp., New York; Ted Bacon, New York, and Jim Greene, Louisville, both with Raymond Bag Corp.; Joe Whittington, Olin Mathieson Chemical Corp., Baltimore; and Arthur Schultz, Reading Bone Fertilizer Co., Reading, Pa.

4. Mr. & Mrs. Max Sparks of Des Moines, H. Morrison Davis of Little Rock, and Mr. & Mrs. G. W. Sherrill of Louisville, all with Southwest Potash Corp.

5. Mr. & Mrs. Walter Sackett, Jr., Bob Day, and Mr. & Mrs. Walter Sackett, Sr., all with A. J. Sackett & Sons Co., Baltimore.

6. Mr. & Mrs. Buck Appleton, Potash Co. of America, Atlanta; Mr. & Mrs. Bruce Osborn, Southern Cotton Oil, New Orleans; and R. L. James, Armour Agricultural Chemical Co., Atlanta.

7. Sheldon Carnes, West Virginia Pulp & Paper Co., New York; Mr. & Mrs. Gene Van Deren, Bluegrass Plant Food Co., Cynthiana, Ky.; Mr. & Mrs. J. C. Denton, Spencer Chemical Co., Kansas City.

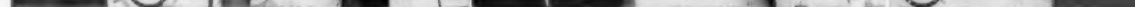
8. Jack Lindsey, International Minerals & Chemical Corp., Shreveport; Mr. & Mrs. Clyde Tandy, Port Fertilizer & Chemical Co., Los Fresnos, Texas; Dr. & Mrs. R. L. Beacher, NPFI, Atlanta.

9. Mr. & Mrs. Fred Corkill, U. S. Borax & Chemical Corp., New York; Mrs. W. B. Gillette and Mrs. John Fletcher, both from New York; Mrs. S. E. Hardwick, Richmond, Va.; and John Fletcher, U. S. Borax & Chemical Corp., New York.

10. Mr. & Mrs. Tom Wright, Texas Farm Products Co., Nacogdoches, Texas, and Mr. & Mrs. C. L. Strughan, American Potash & Chemical Corp., Atlanta.

11. Mr. & Mrs. Bob Walton, U. S. Borax & Chemical Corp., and Gordon Cunningham, Tennessee Corp., all from Atlanta.

12. Mr. & Mrs. W. B. Copeland, Olin Mathieson Chemical Corp., Little Rock.





long run will depend a great deal on how effectively education is permitted to serve the long-range interests of agriculture."

"The county soil fertility program which, I understand, is now operating in almost 150 counties is one of the many examples which might be cited to indicate the kind of work in which the county agent continues to be highly effective," he said. "The county soil fertility program is doing much to emphasize the importance of soil fertility as an essential element in the reduction of production costs and in helping to make agriculture a more self-sufficient segment of our national economy. Certainly it is a program which seems destined to grow and expand. So far it has reached but a token sample of potential area which can be benefited by close attention to the proper use of fertilizers."

An impressive speaker was Jim Thomas of Patterson, Ga., national president of the Future Farmers of America, who said that "with an exploding population, and the competition for the underdeveloped countries, the production of food and fiber will take on increasing importance . . . We Future Farmers

believe that we have a wonderful future."

Speaking on the subject of "A Future Farmer Looks At His Future in Agriculture," young Mr. Thomas paid tribute to the fertilizer industry.

"We boys of the FFA have long realized the importance of plant food in American agriculture," he said. "The revolution in farm fertilizer development and the use of fertilizers has been accompanied by a revolution in farm practices and production. This latter revolution has produced a richer and better farm picture in every sense, and we know that you men and the organization you represent (the National Plant Food Institute) have played a vital role in this task."

"We boys also believe that we are standing on the threshold of a fantastic age in farming," he said. "An age that will make our farming more complex."

"We FFA members who are looking at the future of farming believe several things. We know that in spite of the increased demand for farm products, that a future in farming will demand a greater concept of the economics and management



Soil Management Awards for editors were presented by NPFI board chairman Richard E. Bennett (right); picture at top shows William H. Kircher, editor-in-chief of THE FARMER, St. Paul, Minn., receiving the citation for publications under 300,000 circulation; pictured below is Ralph Wennblom of FARM JOURNAL, Philadelphia, accepting award for editor Carroll P. Streeter, for publications over 300,000 circulation.

of the farm. For more than ever before the farmer will be a businessman. Buying and selling will be just as important as production. In recent years an increasing importance has been placed on the study of farm management in our vocational agriculture classes.

"In the last analysis, we believe that a farmer of the future must be trained and prepared for his vocation. Without the proper agricultural education we believe it will be nearly impossible to be able to survive in tomorrow's agriculture. Efficiency will be as important on the farm as in the factory. Outstanding farmers have already discovered this fact. In addition to efficient operation, the farmer must understand animal physiology, soil chemistry and conservation, genetics, feeds and feeding, all of which necessitate study and preparation. We also believe that tomorrow's farmer must have a deep affection for rural living and must appreciate the joys and disappointments of life on the farm," he concluded.

Another dynamic speaker, Arthur H. Motley, president of the U. S. Chamber of Commerce, talked about the political responsibility of the business community. He urged businessmen to serve with their persons, not just their money. Mr. Motley explained the development and content of the Chamber's political "know-how" course, which has the approval of labor groups as well as manage-

←Key to CF Staff Pictures at NPFI

1. Mr. & Mrs. W. B. Gillette, Texas Gulf Sulphur Co., New York, and Mr. & Mrs. Dean Gidney, Potash Co. of America, Washington.
2. Mr. & Mrs. W. S. Leonhardt and Mr. & Mrs. Loy Everett, Commercial Solvents Corp., New York.
3. Vise Miller, Armour Agricultural Chemical Co., Atlanta; John Hall, Potash Co. of America, Denver; T. W. Oliver, Armour Agricultural Chemical Co., Atlanta; and Bernie Machen, Armour Agricultural Chemical Co., Crystal City, Mo.
4. Mr. & Mrs. Jordan Thorne, John Deere Chemical Co., Pryor, Okla., and Dr. & Mrs. Dick Bahme, NPFI, San Francisco.
5. Charlie Mittleman, Kraft Bag Corp., New York.
6. Ed Smith, Washington, and Buck Appleton, Atlanta, both with Potash Co. of America; Sam Nevins, Olin Mathieson Chemical Corp., Little Rock.
7. George Suggs, Allied Chemical Corp., New York, and John Sanford, Hubbard-Hall Chemical Co., Waterbury, Conn.
8. Stuart Campbell, Grace Chemical Co., Chicago; Walter Bram, Smith-Douglas Co., Inc., Norfolk; and Ray Yates, Ashcraft-Wilkinson Co., Norfolk.
9. B. W. Bellinger, Tennessee Corp., New York, and Lowell Berry, Best Fertilizers Co., Lathrop, Calif.
10. Mr. & Mrs. T. L. Campbell, Spencer Chemical Co., Atlanta.
11. Mr. & Mrs. Quentin Lee, Cotton Producers Association, Atlanta, and Mr. & Mrs. B. J. Phillips, Smith-Douglas Co., Inc., Norfolk.
12. Ray Cartledge, Wilson & Toomer Fertilizer Co., Cottondale, Fla.; I. C. Dukes, National Lead Co., Atlanta; Bill Lehmann, Chilean Nitrate Sales Corp., New York; and D. E. Wolf, Du Pont, Atlanta.
13. Leroy Donald, Monsanto Chemical Co., St. Louis; E. Y. Floyd, Plant Food Institute of North Carolina and Virginia, Raleigh; K. D. Jacob, USDA, Washington; and Owen Poley, Fisons Ltd., Southern Rhodesia.
14. John Forrester and W. H. Stone, Jacksonville, and Ray Cartledge, Cottondale, all with Wilson & Toomer Fertilizer Co.
15. Edwin Pate, Dixie Guano Co., Laurinburg, N. C.; John Hall, Potash Co. of America, Den-

- ver; Ed Smith, Potash Co. of America, Washington; and John Sargent, Federal Chemical Co., Louisville.
16. Harvey O'Neill, Kingsbury & Co., Peru, Ind., and A. F. Dow, Texaco, Inc., Chicago.
17. George Barley, Diamond R Fertilizer Co., Winter Garden, Fla., and Dallas Cantwell, Southern Nitrogen Co., Savannah.
18. T. E. Camp, Jr., Southwest Potash Corp., New York; Bruce Osborn and J. T. Murphy, both with Southern Cotton Oil, New Orleans.
19. Walter Harding, Federal Chemical Co., Louisville, and Dean Keller, Allied Chemical Corp., Indianapolis.
20. Jack Criswell, Agricultural Ammonia Institute, Memphis; Dave Bradford and D. L. Harrison, both with Mid-South Chemical Co., Memphis.
21. John Watt of Armour Agricultural Chemical Co. and Mr. & Mrs. J. E. Murray of Tennessee Corp., all from Atlanta.
22. R. E. Bennett, Farm Fertilizers, Omaha; John Mahan, USDA, Washington; and J. H. Epting, Epting Distributing Co., Leesburg, S. C.
23. Mr. & Mrs. Harold Krueger, Stedman Foundry & Machine Co., Aurora, Ind.; George Barley, Diamond R Fertilizer Co., Winter Garden, Fla.; and Joe Stough, U. S. Borax & Chemical Corp., Columbus, O.
24. Dr. & Mrs. Vincent Sauchelli, NPFI, Washington; Mr. & Mrs. Stacy Randle, New Jersey AES, New Brunswick, N. J.
25. Joe Henderson, New York, and John Cox, Birmingham, both with Continental Can Co.
26. Louis Wilson, NPFI, Washington, and Dr. Clifford M. Hardin, president, American Association of Land Grant Colleges and State Universities, University of Nebraska.
27. Eugene German, Duval Sulphur & Potash Co., Houston; Tom Mitchell, Tennessee Corp., Atlanta; and Tom Nixon, Ashcraft-Wilkinson Co., Atlanta.
28. Ed Kapusta, U. S. Borax & Chemical Corp., New York; Eddie Crouse, CD Fertilizer Corp., Liberty, Ind.; and Ed Aylward, Aylico Chemical Co., Sullivan, Ill.
29. Mr. & Mrs. A. A. Schultz, Reading Bone Fertilizer Co., Reading, Pa.
30. Harold Krueger, Stedman Foundry & Machine Co., Aurora, Ind., and Sam Shelby, Federal Chemical Co., Louisville.

ment, and trains employers and employees how to select, nominate and elect good people to public office. Neither businesses nor individuals can be good citizens unless they participate in these processes, he stressed.

In a special 'bonus' feature, NPFI devoted an afternoon session to

panel discussions on their chemical control project and their in-plant shrinkage study. Moderated by Vincent Sauchelli, the Institute's chemical technologist, the panels were staffed by authorities from each area of the industry that is directly concerned with these two problems.

Edwin M. Glocker of W. R. Grace

& Co. and Stacy B. Randle, president of the Association of American Fertilizer Control Officials, teamed up to report on the new series of Magruder check fertilizer samples.

Mr. Glocker stated that improvement of the average precision within laboratories is narrowing the margins of tolerance in variability from any absolute value, and can save much in over-formulation costs. The 140 laboratories now subscribing to the Magruder check sample series, he said, are helping greatly to improve their own and one another's accuracy and precision.

Mr. Randle described the values from the planned analytical study program, and told how they are helping to reduce errors in manufacturing, sampling and analysis. The industry, he emphasized, must do all it can to minimize errors.

Dr. Sauchelli set the stage for the discussions by estimating that the industry's annual losses in overages amount to \$6 to \$8 million. He outlined the collaborative studies undertaken some three years ago, and told of the potential benefits to be gained.

C. H. Russell of Monsanto Chemical Co. and J. R. Archer of International Minerals & Chemical Corp. jointly tackled the topic of the NPFI manual on standardized methods of analysis. They briefly reviewed the data compiled on this project and stressed the importance to the industry of following such a program.

In the panel discussion on in-plant shrinkage, Dale C. Kieffer of Smith-Douglass Co., Inc. analyzed the causes of materials losses in processing, and Albert Spillman of Fertilizer Manufacturing Cooperative, Inc. investigated possible remedies.

Stating that most anyone with a little effort can locate his losses,

NPFI's New Officers and Directors

The board of directors of the National Plant Food Institute June 15 elected J. D. Stewart, Jr., of Louisville, Ky., as chairman of the board, and John W. Hall, of Denver, as vice chairman of the board, at the conclusion of NPFI's convention.

Mr. Stewart is president of Federal Chemical Company at Louisville, and Mr. Hall is president of The Potash Company of America at Denver.

Other officers of the Institute, all of Washington, D. C., were re-elected as follows: Paul T. Truitt, president; W. R. Allstetter, vice president; Louis H. Wilson, secretary; and William S. Ritnour, treasurer.

Members of the executive committee elected by the board are: J. C. Denton, president of Spencer Chemical Company, Kansas City, Mo.; Mr. Hall; J. J. Lanter, president of Central Farmers Fertilizer Company, Chicago; C. T. Prindeville, vice president of Swift & Company, Chicago; W. E. Shelburne, president of Armour Agricultural Chemical Company, Atlanta, Ga.; Mr. Stewart; Mr. Truitt; Jacob White, president of the Nitrogen Division, Allied Chemical Corporation, New York City; and Fred J. Woods, president of The Gulf Fertilizer Company, Tampa, Fla.

At the business meeting on June

13, members of the Institute elected 12 new members to their board of directors for terms expiring in June 1963: Robert E. Ashcraft, Ashcraft-Wilkinson Company, Atlanta; Arthur Wilkinson, The Consolidated Mining & Smelting Company of Canada Limited, Montreal; L. Dudley George, Richmond Guano Company, Richmond, Va.; Elwood I. Lentz, Western Phosphates, Inc., Salt Lake City; Ben D. McCollum, J. R. Simplot Company, Pocatello, Idaho; Frank Nelson, The Rath Packing Company, Waterloo, Iowa; Hugo Riemer, United States Borax & Chemical Corporation, Los Angeles; Ed N. Shelton, Tennessee Corporation, New York City; Wayne H. Shidaker, The Farm Bureau Cooperative Association, Inc., Columbus, Ohio; C. D. Siverd, American Cyanamid Company, New York City; Tom K. Smith, Jr., Monsanto Chemical Company, St. Louis, Mo.; Fred J. Woods, The Gulf Fertilizer Company, Tampa, Fla.

Gene Van Deren, Bluegrass Plant Foods, Inc., Cynthia, Ky., was elected to the board to fill a term expiring in June 1961; William E. McGuirk, Jr., Davison Chemical Division, W. R. Grace & Co., Baltimore, Md., and Howard A. Parker, Parker Fertilizer Company, Inc., Sylacauga, Ala., were elected for terms expiring in June 1962.



1. Paul Truitt, NPFI, Washington, and Stacy Randle, president, Association of American Fertilizer Control Officials, New Brunswick, N. J.

2. Mr. & Mrs. Ed. Kingsbury, Kingsbury & Co., Indianapolis, and Sam Clement, Monsanto Chemical Co., St. Louis.

3. Mr. and Mrs. Bruce Cloaninger, American Association of Fertilizer Control Officials, Clemson, S. C.

4. H. H. Tucker, Sohio Chemical Co., Lima, O., and Wayne Shidaker, Farm Bureau Cooperative Assn., Columbus, Ohio.

5. Jack Snyder, Snyder Chemical Co., Topeka, Kans., and Grant Kilbourne, J. R. Simplot Co., Pocatello, Idaho.

6. Doris Robison, International Ore & Fertilizer Corp., New York, and Bill Garman, Best Fertilizers Co., Lathrop, Calif.

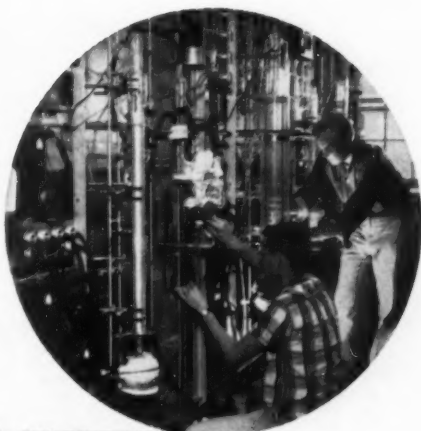
7. James Bibbins, Sohio Chemical Co., Lima, O., and Eddie Crouse, CD Fertilizer Corp., Liberty, Ind.

8. Ed Kingsbury, Kingsbury & Co., Indianapolis, and H. B. Tatum, U. S. Phosphoric Products, Tampa.

9. Len Gopp, International Minerals & Chemical Corp., Skokie, and Mr. & Mrs. Walter Harding, Federal Chemical Co., Louisville.

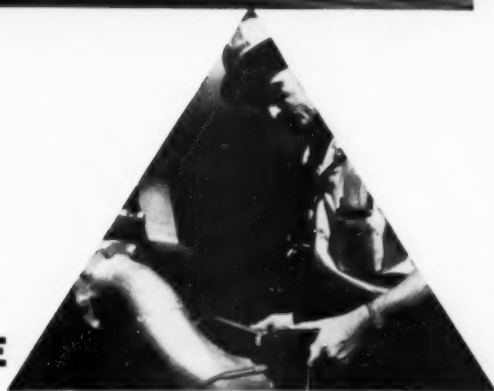
QUALITY

Texaco offers chemical solutions that consistently meet your formulations' requirements as to ingredient quality.



AVAILABILITY

because of its centrally located Lockport (Ill.) facility, Texaco provides immediate delivery of both nitrogen solutions and ammonia (including 50% aqua solution).



To
BALANCE
fertilizer

SERVICE

Texaco offers a wide range of technical services to help you break a production bottleneck or develop a new product.

formulations
...begin with this Texaco formula

Here's a formula that can help you balance all the factors effecting fertilizer formulations. The ingredients? You can see them above: Texaco quality, availability, and service.

But why not weigh the advantages of this service yourself? Write for details—and our free 40-page manual on ammonia and nitrogen solutions—to Texaco Inc., *Petrochemical Sales Division*, 332 South Michigan Ave., Chicago 4, Ill., or 135 East 42nd Street, New York 17, N. Y.

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you better
.....*



● Armour's modern ammonia plant near Crystal City, Missouri

For over sixty years, Armour has been serving American Agriculture; supplying the ever-growing demand for Armour and Vertagreen brand complete fertilizers by farmers and home gardeners. For more than a decade, we have served the fertilizer industry with phosphate products from our modern phosphate facilities in Bartow, Florida.

Each year, it has been our aim to improve our facilities, products and services. In 1959, Armour took another step forward to serve

you better with the acquisition of a modern ammonia plant at Crystal City, Missouri. Now, Armour's service to agriculture and the industry is more complete than ever.

As America's needs for more and better fertilizers continue to grow, Armour Agricultural Chemical Company will continue to improve the products and services that have made the Armour "A" a symbol of quality in the fertilizer industry . . . the "BIG A" in agriculture.

31 sales offices serving the fertilizer industry

ARMOUR AGRICULTURAL CHEMICAL COMPANY
General Offices, Atlanta, Georgia

Mr. Kieffer pointed out why losses have become so important. Pre-war losses amounting to around two percent for a typical plant were no great concern, he said, with ammoniation rates running only 2.4 to 3 pounds of ammonia per 100 pounds of ordinary superphosphate, and with an average 1941 analysis of 3.8-9.6-6.4, or 19.8 units of plant food per ton of mixed goods. But in 1957-58 the plant nutrient content of mixed goods had risen to 30.22%, and continues to climb.

The granulation plant affords many more opportunities for losses, he stated: ammoniator efficiency is a key spot, with many losses as fumes and pipe leakage; overheating and dust losses in dryers and dust losses in coolers are another big source. Spillage between bins is another problem, he said, although recovery here is fairly simple. Overweights and dust in the shipping section are another important loss, Mr. Kieffer showed, with tolerances set to avoid state deficiency penalties. Actually, he concluded, a typical present-day granular overformulation is 3.4% N, 2.74% P_2O_5 and 2.15% K_2O .

Mr. Spillman began analyzing possible remedies by stressing the importance of control of plant operations—keeping a record of everything that goes on during the day. Newer materials are making the situation even more critical, he continued, and make it even more essential that key operating personnel exchange information with technical service representatives of materials suppliers, equipment manufacturers, and USDA and TVA research personnel.

Weighing is a key factor, and demands close supervision, he emphasized, while contamination, safety precautions, preventive maintenance and spare parts supplies for equipment, and accuracy checks on meters and bagging equipment also demand careful attention. He suggested occasional check-weighing of outbound cars or trucks, and use of "quick check" determination methods on N and P_2O_5 , which are accurate enough to keep control.

Mr. Spillman also urged a close check on uniformity of incoming materials as regards analysis, quality and moisture content. Citing some examinations at his own plant, he told how specific gravity determinations of ten cars of phosphoric acid showed variations from 1.69 to 1.77, and specific gravities of cars of solutions varied from 1.03 to 1.18. Study of ten cars of triple superphosphate showed variations from

CF Staff Pictures from NPFI Meet

1. T. C. Rogers, Nitrogen Div., Allied Chemical Corp., New York, and James E. Rossman, Hubbard-Hall Chemical Co., Waterbury, Conn.
2. Mr. & Mrs. Ed Kingsbury, Kingsbury & Co., Indianapolis, and Joe Sharp, Spencer Chemical Co., Kansas City.
3. D. L. Harrison, Mid-South Chemical Co., Memphis; Borden Chronister, Nitrogen Div., Allied Chemical Corp., Hopewell, Va.; and Jim Turner, U. S. Borax & Chemical Corp., Knoxville.
4. Clyde Kennedy, American Cyanamid Co., New York, and Mr. & Mrs. Joe Wright, Texas Farm Products Co., Nacogdoches.
5. Mr. & Mrs. Zenas Beers, NPFI, Chicago, and Mr. & Mrs. M. E. Peterson, Sinclair Petrochemicals, Inc., Chicago.
6. E. C. Horne, International Minerals & Chemical Corp., Skokie, and R. T. Yates, Ark-Mo Plant Food Co., Corning, Ark.
7. Mrs. Sam Nevins, Little Rock; Harold Wehrenbrecht, Bemis Bro. Bag Co., New Orleans; Mr. & Mrs. Angus Taylor, Jr., The Chemical & Industrial Corp., Cincinnati.
8. George Kalteissen, Allied Chemical Corp., New York, and Mr. & Mrs. William A. Nist, Dayton Fertilizer Corp., Dayton, N. J.
9. W. L. Garman, Best Fertilizers Co., Lathrop, Calif.; R. H. McCough, Collier Carbon & Chemical Co., Los Angeles; and A. Wilkinson, Consolidated Mining & Smelting Co., Montreal, Canada.
10. Jim Greene, Ashcraft-Wilkinson, Des Moines, and Mr. & Mrs. Irvin Morgan, Jr., Farmers Cotton Oil Co., Wilson, N. C.
11. William L. Hill, USDA, Washington, and Dr. & Mrs. Werner Nelson, American Potash Institute, Lafayette, Ind.
12. Mr. & Mrs. John Mahan, USDA, Washington.
13. Jack Rutland, Western Carolina Phosphate Co., Waynesville, N. C.; Bob Linderman, International Minerals & Chemical Corp., Skokie; and W. E. Shelburne, Armour Agricultural Chemical Co., Atlanta.
14. Mr. & Mrs. G. E. Garland, Texaco, Inc., New York.
15. Charles Prindle, Swift & Co., Chicago; Tom Bridgers, Farmers Cotton Oil Co., Wilson, N. C.; and Dudley George, Richmond Guano Co., Richmond, Va.
16. H. E. Ferguson, Balfour, Guthrie & Co., San Francisco; K. T. Seaborne, Cominco Products, Spokane; and Carl Hass, Valley Nitrogen Products, Helm, Calif.
17. J. D. Stewart, Jr., Federal Chemical Co., Louisville; Hugo Reimer, U. S. Borax & Chemical Corp., New York; and L. G. Black, Ark-Mo Plant Food Co., Corning, Ark.
18. Mr. & Mrs. Jim Zwemer, Monsanto Chemical Co., St. Louis.



The Big Plus in Plant Equipment is



3.6% to 6.76% in moisture content, and available phosphoric acid ranged from 44.5% to 47.94% in the same cars. As for potash, he told how ten cars of muriate varied from 60.4% to 61.8% K_2O .

In conclusion, Mr. Spillman spelled out the losses that can occur at different-size plants when bagging scales are over by a few ounces.

On invitation from the session chairman, Frank Holland of the Florida control office spoke from the audience of the urgency of the physical problems in taking and handling an accurate sample as contrasted with the lesser problem of chemical analysis.

Also invited to comment from the floor was Bruce D. Cloaninger, South Carolina fertilizer control official and perennial secretary-treasurer of the Association of American Fertilizer Control Officials. He said that deficiency problems are becoming greater as the fertilizer season becomes shorter, as most seem to occur on overtime and night shifts. He suggested that human-error sampling faults in warehouse stacks would be minimized if manufacturers would mark grades on every visible side of each bag.

In addition, Mr. Cloaninger said that every effort to reduce the number of grades offered would reduce the number of sampling errors. He also called for stepped-up efforts to promote uniform tolerances among the states to simplify formulation for the many plants that ship across state lines.

The Tuesday morning session — dealing with the distribution phase — opened with the showing of NPFI's new film, "Bread from Stone," designed to acquaint the general public with the important role of the fertilizer industry in producing and reducing the cost, the goods consumed by the average citizen every day.

Tracy Adcock of Swift & Co., reporting for the advisory committee on merchandising the NPFI program, gave a number of specific recommendations on how the Institute could best acquaint its membership with the services it offers. The proposals included: brief but complete presentations by regional directors, more specific mailing lists for various interest groups, descriptive handbook of services offered, and regional newsletters.

Drs. George M. Beal and Joe M. Bohlen, rural sociology professors at Iowa State University who are now quite familiar to the industry through their studies on information dissemination and new practice

adoption by farmers, presented data and preliminary conclusions from a new study of dealer characteristics. Correlating information from four different studies, they pointed out the dealer's role in the fertilizer marketing pattern and described the farmer's expectations of his dealer. (For a complete report of this important study, see special series of articles beginning in August CF.)

Murray C. Renick, president of Rolla Feed Mills, Inc., Rolla, Mo., told the audience that fertilizer manufacturers "have a challenging opportunity to help a dealership grow and prosper, by furnishing him know-how and by providing him with the necessary tools to operate a successful farm supply store."

He said that there are many confused dealers who are losing money and don't know it, dealers who for years have been using up and depreciating their assets without any idea of their true cost of operation.

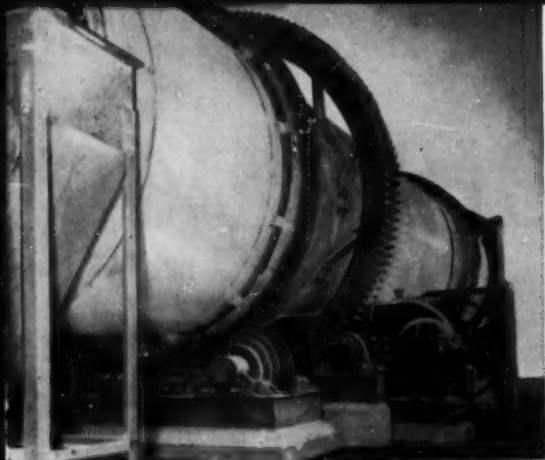
Mr. Renick leveled criticism at some members of the fertilizer industry who are so anxious to sell goods that they sell through "fly-by-nights and truckers." This leaves legitimate dealers little incentive to sell fertilizer, he said, when they know that truckers can buy cheaper than actual dealers.

He called on the industry to furnish dealers with know-how, and to help them grow and prosper so they can continue to push fertilizer at a profit. Recalling his own experiences, he said that the dealer, to be successful, should: survey his market; departmentalize; get monthly profit-and-loss statements; maintain route sheets (call reports) and truck records; offer his salesmen incentive plans; exercise credit control; watch age of accounts receivable; feature testimonial ads and cooperative ads; provide employee training; and carefully measure his profits.

Pursuing his subject of "What a Dealer Should Know," he said "I sincerely believe that your salesmen should be trained so that they can give guidance to dealers who so desperately need help. Most salesmen are of little help to us dealers, as they are not properly trained. I believe that the fertilizer industry should have trained personnel, on a national or local level, so that they may hold training meetings with dealers, monthly or semi-annually, to guide them in merchandising, selling, incentive plans, credit control, and profit possibilities."

Describing the type dealer who "will survive and be successful in the future," Mr. Renick said: "First

(Concluded on page 64)



RUGGED ROTARY COOLERS

Remarkable cooling ability. Built in all sizes.

DEPENDABLE DRYERS

Optimum efficiency with minimum chemical losses. All sizes.



FUMES

MOISTURES

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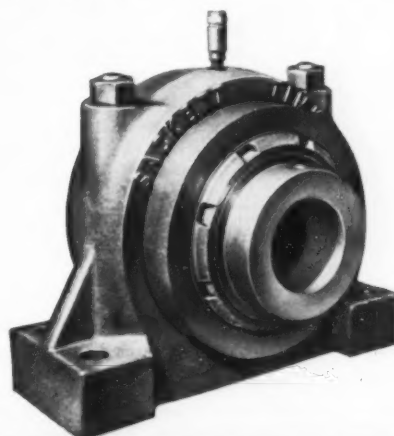
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BIGGER BETTER BEARINGS

Convert your present equipment to rugged SACKETT TIMKENS. All sizes in stock.

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PLANTS

SUPERPHOSPHATE PLANTS

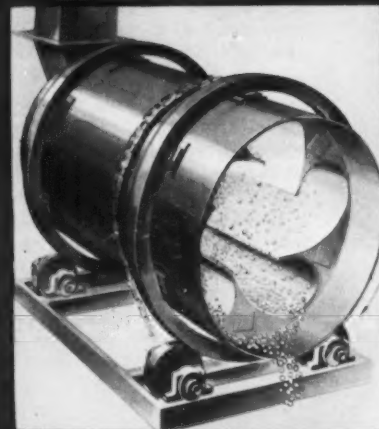
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STAR GRANULATORS

These Sackett Patents insure speed production and long life.



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And Builders Of

Summers Fertilizer

Announcement from Summers Fertilizer Company's home office in



Totman

Baltimore advises that Brigadier General Clayton O. Totman, recently retired from the U. S. Marine Corps., has become associated with Summers' interests. As assistant vice president, his duties will be in the Company's various administrative departments including the development of a new Soil & Forest Conservation Division. He graduated from the University of Maine in 1935 with a Bachelor of Science Degree in Forestry. His final Navy assignment was special assistant to the Secretary of the Navy developing policy and management of the Navy's programs for Conservation of Soils Water, Forests, Grasslands, Fish and Wild Life in its more than 750 installations of all types throughout the world. During his leaves from duty he has developed in Maine his own Conservation Program by establishing a sizeable tree farm on which he has already planted fifty thousand spruce trees.

The Company plans to expand, under General Totman's direction, its activities in these areas of fertilizer consumption with emphasis on Forestry needs. Several experiments, in cooperation with the University of Maine School of Forestry, are already underway.

Nitrogen Products

Richard E. Deal has been named a vice president of Nitrogen Products, Inc., parent firm of Dayton Fertilizer Co., effective July 15.

He has been with F. W. Tunnell & Co., Inc. for the past 14 years where he served as secretary and fertilizer sales manager. Deal also was employed by the Barrett Division of Allied Chemical Corp., for nine years.

US Testing

Noel Schwartz, director of research, United States Testing Company, Inc., has announced the appointment of Dr. Robert C. Putnam as chief chemist. Dr. Putnam's duties will include supervision of the testing company's chemical division with particular emphasis on research and development programs.

PEOPLE in the

Cyanamid

Edward H. Smythe has been appointed marketing director for the Agricultural Division of American Cyanamid Company, announced Clifford D. Siverd, general manager, for the division.



Smythe

Mr. Smythe succeeds Burton F. Bowman who was recently named assistant general manager for the division.

Mr. Smythe has been assistant marketing director for the division and has had the additional responsibility of supervising the field sales force. In 1957, he joined American Cyanamid and served as merchandising manager which included the development of new products, marketing concepts, merchandising strategy, and sales promotion.

The promotion of John H. Howard to sales manager for the agricultural division of Cyanamid effective July 1 has also been announced by Mr. Smythe.

Mr. Howard was formerly regional manager for the midwest region. In addition to sales responsibilities for all Cyanamid animal and plant industry products, he will also be responsible for sales training. Mr. Howard joined American Cyanamid in 1955.

Named to replace Mr. Howard as midwestern regional manager is Dr. Max J. Harvey, former assistant midwest manager, with Cyanamid since 1950.

N. C. State

Appointment of Dr. H. Brooks James, veteran member of the North Carolina State College faculty, as dean of the college's School of Agriculture has been announced by Dr. John T. Caldwell, chancellor of the institution.

Dr. James will succeed Dr. D. W. Colvard, who resigned to become president of Mississippi State University, effective July 1. Dr. James has been director of instruction in the School of Agriculture since 1957, and a faculty member since 1939. He is chairman of the college's Athletic Council and president of the Atlantic Coast Conference.

Armour

James K. Sims, Sr., has been appointed personnel manager of the Armour Agricultural Chemical Company, it has been announced by W. E. Shelburne, president.



Sims

Mr. Sims was engineering personnel manager for Lockheed Aircraft Corp.,

Marietta, Ga., from 1951 until his present appointment.

Thomas E. Sharp has been appointed market development manager for Armour, Mr. Shelburne has also announced.

Mr. Sharp was with the research division of Armour and Company, Chicago, from 1951 until his present appointment. Prior to that time, he was associated with Standard Oil of Indiana in research and technical sales for 14 years.

Iowa State

Doyle E. Peaslee, who received his Ph.D. degree from Iowa State University this year, has been appointed to the staff of The Connecticut Agricultural Experiment Station, director James G. Horsfall announces.

A native of Kansas, Dr. Peaslee has made soil fertility studies at Kansas State College and at the Iowa State University. At the Station, he will investigate methods of testing soils for plant food elements.

Arkansas

Governor Faubus has appointed Joe Brady, general manager, Delta Fertilizer Co., Helena Cotton Oil Co., Helena, to the Plant Board as the representative of the fertilizer and cottonseed oil industry. Mr. Brady succeeds Lloyd Dhonau, sales manager, Arkansas Plant Food Co., North Little Rock, whose term had expired.

Richardson

The appointment of C. A. Cremens as Chicago district manager has been announced by Richardson Scale Co. He has been with the firm for fourteen years.

INDUSTRY

V-C

John L. French, a fertilizer salesman and manager for more than 30 years, has been named general sales manager for the fertilizer division at Virginia - Carolina Chemical Corporation. Mr. French succeeds A. P. Gates who recently was elevated to vice president.



French

The appointment marks the highlight of a 33-year career during which Mr. French served Virginia-Carolina in every possible sales capacity.

Gilman Paper

Howard Gilman, executive vice-president of Gilman Paper Company, announces the following changes in its executive and sales personnel.

Harry C. Lawless becomes a staff vice-president and a member of the executive advisory committee.

Dean Wellington becomes general sales manager with authority over the sales of the following divisions:

Standard Products Division—William Peist, sales manager.

Specialty Papers & Pulp Division—Robert Bringman, sales manager.

Multiwall Bag Division—Edward Burgers, Jr., sales manager.

Bleached Board Division—

Tom L. Jones, formerly vice-president and director of multiwall sales of Arkell & Smiths, and recently regional sales manager of the Multiwall Division of West Virginia Pulp and Paper Company, has joined Gilman and becomes special representative in the multiwall bag division.

Buell Engineering

Jack L. Schumann has been elected president and a director of Buell Engineering Company, Inc., it was announced by R. F. Palyter, chairman of the board. Mr. Schumann succeeds J. A. McBride, who will continue as a board member and consultant. Mr. Schumann, 46, joined the Buell organization in 1946.

Hubbard Hall

Executive changes within the Hubbard-Hall Chemical Co. were announced by the firm's board of directors.

Frederic R. Kellogg, formerly president, has been elected chairman of the board, and Edward R. Jones, formerly executive vice president, has been advanced to president and chief executive officer. Mr. Jones also is treasurer.

Richard F. Puffer has been elected vice president and will be director of the industrial division.

James R. Rossman, formerly vice president, has been designated executive vice president.

Charles T. Kellogg has been elected assistant treasurer.

Northwest Nitro

James V. O'Leary has been elected president of Northwest Nitro-Chemicals, Ltd., and Tom B. Potter has been elected executive vice president, it was announced June 2 following a meeting of the company's board of directors.



O'Leary



Potter

Northwest is the Canadian agricultural chemicals affiliate of Commercial Solvents Corporation. Mr. O'Leary was previously general sales manager of Commercial Solvents Corporation. Mr. Potter has been Northwest's sales manager since August, 1959.

Agrico

J. J. Repko has been named production superintendent for fertilizers and chemicals at the Buffalo, N. Y., plant of The American Agricultural Chemical Company, it was announced by R. M. Richey, general superintendent.

Texas Gulf Sulphur

Election of Dr. Guy T. McBride, Jr. as vice president of Texas Gulf Sulphur Company has been announced by Claude O. Stephens, president. After having acted as a chemical engineering consultant to the Company for several years, Dr. McBride joined Texas Gulf on June 1, 1958 and a year later was named manager of the Research Department. He was formerly associate professor of chemical engineering and Dean of Students at The Rice Institute, Houston.

AP & C

M. E. McCollam has been appointed consulting agronomist by American Potash & Chemical Corporation.



McCollam

it was announced by W. M. Clines, general sales manager, Western.

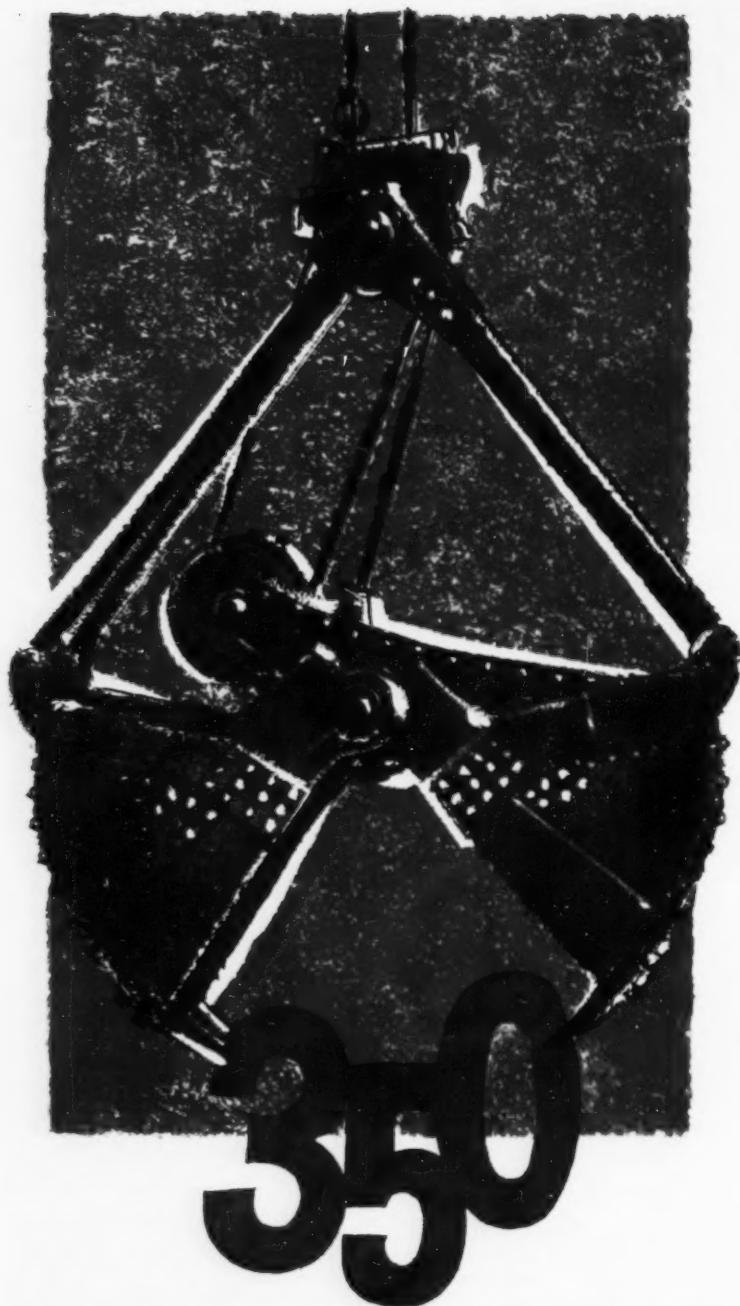
Dr. McCollam held the post of agronomist at Washington State College's West Washington Experimental Station for nine years prior to his association with the potash industry in 1929. He joined the American Potash Institute in 1935 and served with the organization until his retirement January 1 of this year.

Dr. McCollam will headquarter at AP&CC's San Francisco district sales office while on company assignments. In addition to his position with AP&CC, he is currently serving as chairman of the Soil Improvement Committee of the California Fertilizer Association.

IM & C

Donald G. Wolff has joined the patent department of International Minerals & Chemical Corporation, Skokie, Illinois, as a patent attorney. He was a patent attorney with Wyandotte, Michigan, before joining IMC, and prior to that had been in patent law in petroleum, food, and paper industries.

Herbert S. Swan, Jr., has joined International, as supervisor, chemical and industrial advertising and sales promotion. He was creative director for J. W. Spellman, Inc., Boston advertising agency, before joining IMC, and prior to that had held advertising positions with General Electric Company and Procter & Gamble.



sizes and types make this the most complete line of Clamshell Buckets anywhere. Write for free illustrated catalog. Blaw-Knox Equipment Division, Pittsburgh 38, Pa.

BLAW-KNOX
Clamshell Buckets

Chase Bag

Richard J. Price has been appointed chief industrial engineer of Chase Bag Company. He will direct the company's industrial engineering department, now headquartered at St. Louis. Mr. Price was previously associated with Continental Can Company in various industrial engineering capacities.



Price

Dorr-Oliver

Charles H. Scott has been named chief mechanical development engineer by Dorr-Oliver Incorporated, Stamford, Connecticut. He has been associated with the company for 33 years, most recently handling engineering coordination as well as mechanical development within the Development Engineering Department.

Mr. Scott is considered Dorr-Oliver's most prolific inventor, since he has been granted 57 patents by the United States, many of these developments also having been patented in 22 foreign countries.

West Virginia

West Virginia Pulp and Paper Company has promoted John Floyd to the newly created position of technical sales service manager for its multiwall bag division, it was announced by Victor S. Luke, division manager. Mr. Floyd joined West Virginia in 1954.

US Borax

Appointment of Dr. Robert F. Crawford as agricultural research scientist for U. S. Borax Research Corporation, Anaheim (Calif.), is announced by Dr. C. L. Randolph, vice president of the United States Borax & Chemical Corporation subsidiary.

General Chemical

Thomas W. Collins, Jr., has been named manager of agricultural chemical sales for Allied Chemical's General Chemical Division, it is announced by John L. Damon, director of agricultural chemicals.

With the division 25 years, Mr. Collins was agricultural chemical production supervisor prior to becoming assistant sales manager in 1951. Earlier he served as chief chemist of General's agricultural chemical plant at Baltimore, Maryland.

HONORS

Manufacturing Chemists

R. C. McCurdy, president of Shell Chemical Company, was elected chairman of the board of the Manufacturing Chemists' Association during the organization's 88th annual meeting at The Greenbrier.

He succeeds John T. Connor, president of Merck & Co., Inc.

C. L. W. Swanson

Dr. C. Loyal W. Swanson, chief agronomist for Texaco, Inc., was recently elected to membership in the University of Illinois Chapter of Gamma Sigma Delta, the Honor Society of Agriculture. Eligibility for membership is based largely on scholarship and "by virtue of a signal service to agricultural development." Dr. Swanson is a graduate of Iowa State University with a major in soils. He has offices in Chicago and is responsible for research and development activities as related to fertilizers for Texaco.

India

The Plant Food Pavilion set up by the Fertiliser Association of India in collaboration with its seven members and the Union Ministry of Food and Agriculture at the World Agriculture Fair was given a Special Award in the National Sector.

The Prime Minister, Shri Jawaharlal Nehru, presided over the closing ceremony. The prizes were distributed by the Vice-President, Dr. Radhakrishnan. The award, a golden medal, was received by Shri C. R. Ranganathan, executive director of the Fertiliser Association of India, on behalf of the participants in the Plant Food Pavilion.

The participants in the Pavilion were: The Fertiliser Association of India, Sindri Fertilizers and Chemicals Ltd., E.I.D. — Parry Group, Union Ministry of Food and Agriculture (Fertilisers and Manures Section), the Kisan Khad Scheme of India, Rallis India Ltd., Shaw Wallace & Co., Ltd., Japan Ammonium Sulphate Export Co., Ltd., and D.C.M. Chemical Works.

The Plant Food Pavilion provided an ideal example of concerted effort in a common cause and showed how the resources of private and public sectors could be pooled together in the interests of the country.



MURIATE OF POTASH for the PLANT FOOD INDUSTRY

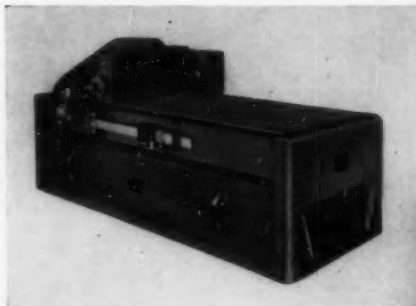
THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

* Trade Mark

Southwest Potash Corporation

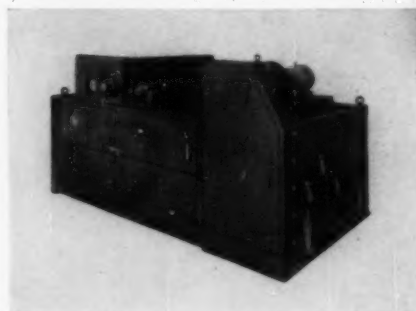
PROFIT FORMULA: $QC + IC = BP/LC$

QUALITY CONTROL + INVENTORY CONTROL = BETTER PRODUCTS AT LOWER COSTS



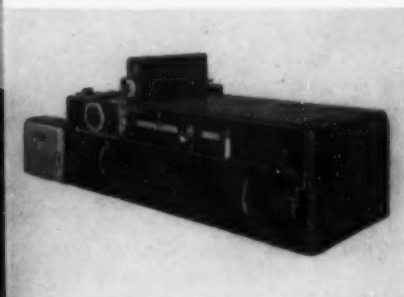
HI-WEIGH (Models 37-20 & 37-42) Weighing Feeders for:


- blending or feeding dry ingredients . . . ammonia, rock dust, solid nitrogen, potash, super, triple-super, etc.



PNEU-WEIGH (Model 36-20) Weigher for:

- proportioning coating agents to pills or granules
- proportioning acids to rock dust
- check-weighing incoming bulk ingredients
- checking recycle for process efficiency
- interdepartmental inventory checking



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INCREASE PROFITS
OF LEADING
FERTILIZER
FORMULATORS!

High fidelity formulation plus rugged dependability are essential to any profitable ammoniation or granulation process. Omega Feeders and Weighers subjected to the severest conditions, have maintained super-accurate fertilizer analysis . . . assuring top quality finished goods and preventing waste of vital ingredients.

MODEL 37-20

High Capacity — feed rates of over 3,000 lbs. per min.
High Accuracy — $\pm 1\%$ by weight of set feed rate within range
Wide Range — provided by 100:1 variable speed transmission
Bulletin — 35-M62

MODEL 37-42P

Extra High Capacity — feed rates to 10,000 lbs. per min.
High Accuracy — $\pm 1/2\%$ of max. weight (weigher); $\pm 1\%$ by weight of set feed rate within range (feeder)
Wide Range — 10:1
Bulletin — 35-20A-1

MODEL 36-20

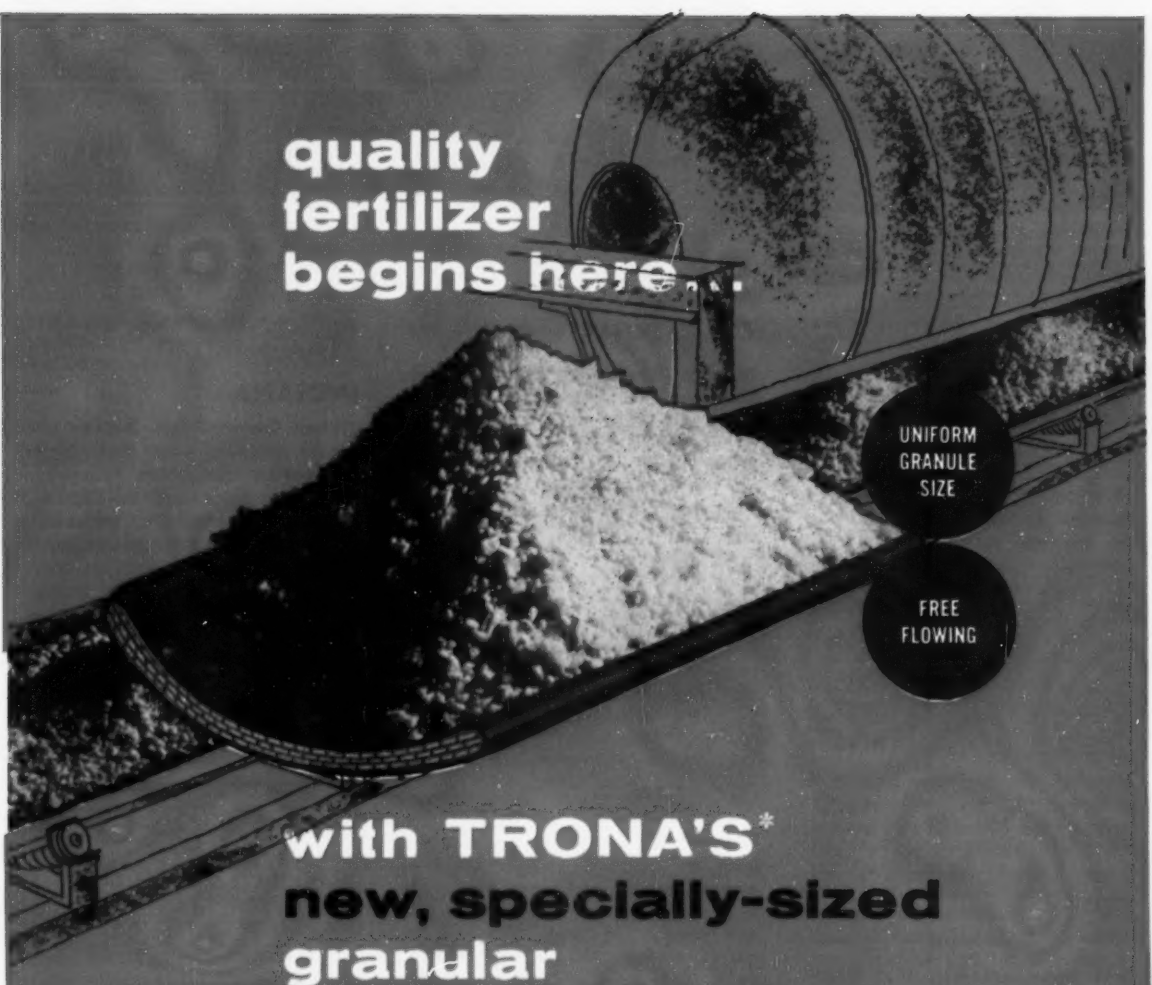
High Capacity — 0 to 10, 100, 500, 1000, 2000, 3000 lbs. per min.
High Accuracy — $\pm 1/2\%$ of maximum rate
Wide Range — 10:1 (constant speed drive); 50:1 (variable speed drive)
Bulletin — 36-P1



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GRANULE
SIZE

FREE
FLOWING

with TRONA'S^{*}
new, specially-sized
granular
POTASH

Quality fertilizer granulation begins with Trona's all-new, specially-sized granular muriate of potash. The carefully regulated and controlled screen size results in reduced segregation and uniformity of finished product. Whatever your mixing method—batch or ammoniation, Trona's new granular assures a quality fertilizer uniform in particle size.



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Plants: TRONA AND LOS ANGELES, CALIFORNIA; HENDERSON, NEVADA; SAN ANTONIO, TEXAS
(AMERICAN LITHIUM CHEMICALS, INCORPORATED AND SAN ANTONIO CHEMICALS, INCORPORATED)

Producers of: BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES
PERCHLORATES • MANGANESE DIOXIDE and other diversified chemicals for Industry and Agriculture

CHANGES

Ashcraft-Wilkinson

Ashcraft-Wilkinson Company, Atlanta, has been named exclusive sales agents for Hou-Actinite (Houston sludge) it was announced by George W. McCarty, chairman of the firm. A five year contract was awarded by the City of Houston, Department of Public Works.

Sales will be concentrated in Texas and surrounding states, Mr. McCarty said, with a majority of the product going to fertilizer mixers and manufacturers.

Calspray

In a major organizational move, California Spray-Chemical Corporation recently announced the consolidation of its Mid-Atlantic and New England districts, effective June 1. According to M. E. Wierenga, Calspray's marketing manager and vice-president, the move will give the company more effective customer contact and will result in substantial administrative and equipment economies.

Manager for the new district is Dr. Robert T. Wallace, currently managing the Mid-Atlantic district. He will be assisted by Mr. Charles Lupsha, formerly assistant to Mr. Wierenga.

Sturtevant

J. D. Robertson, Inc., 3133 Maple Drive, N.E., Atlanta 5, Ga., manufacturers representatives who use a private plane to keep in touch with prospects throughout the Southeast, have been named to represent Sturtevant Mill Company, Boston 22, Mass. The group will represent Sturtevant in eight southeastern states—North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, and Virginia.

Union Special

Union Special has just recently completed the move into its newly constructed building at Atlanta. This is the third important expansion that has occurred in Atlanta since the office was first opened in 1933.

Union Special's Atlanta territory sales organization is headed by William G. Booth, manager, and Philip T. Lancaster, assistant manager, with William S. Carter, office manager. The phone number is now Trinity 5-9237. The new office address is 2120 Plasters Bridge Rd., N.E.



CALIFORNIA

Stauffer, Shell and Western States Chemical have joined hands to build at Dominguez a plant with capacity of over 50,000 annual tons to produce a full line of complex solid fertilizers for the Western market. To be in operation early in 1961, the plant will supply nitrogen, phosphate and potash fertilizers.

DELAWARE

American-Israel Phosphate Co. has been chartered with authorized capital stock of \$250,000. Corporation Trust Co., Wilmington, is serving as principal office.

GEORGIA

McLeod's Fertilizers, as we reported back in January, and which you may remember as Omega Fertilizer Works, have moved to Tifton. As we told you at the time, they had to move because the railroad moved away from them at Omega.

John D. McLeod is the owner. The old plant is still in use, specializing in bagging what Tifton makes.

The new Tifton plant has a capacity of 40 to 45 hourly tons, and storage space for 12,000 tons of finished goods—and has been running 24 hours a day, under the supervision of A. J. Frazier. Omega can store 4,000 tons. The paper work is still located at Omega, and a private two-

way radio set-up keeps the two in constant touch.

INDIANA

Clinton County Farm Bureau plans a bulk blending plant at Frankfort, to produce fertilizers tailored to match soil tests they will make. It will be built and the grounds of the Fairground elevator owned by the cooperative.

LOUISIANA

Guaranty Fertilizer Co., Bunkie, last month suffered a fire estimated at \$400,000 damage. The two story building, which covered two square blocks, house a granulating plant and all other machinery, plus trucks and other equipment. All was a total loss, but covered by insurance.

The fire, which took place in the early morning hours, was already out of control when the firemen arrived. Defective wiring was blamed. Roy Fontaine, owner, says it will be rebuilt in time for next season operation.

Farm Chemical Services, Inc., Monroe, has been chartered with capital stock listed as \$25,000.

International Fertilizer Co., Dover, Del., has been granted a Louisiana charter.

MISSISSIPPI

Dixie Fertilizer Company, Meridian, has held ground-breaking ceremony.



Left: John D. McLeod, owner of Omega Fertilizer Works, shown with a bag of fertilizer which has just rolled off the line. Right: New fertilizer plant in Tifton, Ga., constructed by McLeod's Fertilizers.

ies for the \$1,000,000 plant which is said to be the largest of its kind in the US. Sludge will compose some 30% of the raw material, and the plant will have a capacity of 120,000 annual tons of fertilizer.

NORTH DAKOTA

North Dakota Nitrogen has, at least for the time being, dropped its plans to build a plant to utilize the lignite stockpile at the Garrison dam. Tight money was blamed by George C. Van Nostrand, president of the 1958-founded concern, for the change in plans.

OREGON

N. E. Wilber, Harbor, has a 15 year lease from the State Land Board on a 20-mile strip of coastal water, from which he plans to harvest kelp and seaweed as raw material for fertilizer. The lease calls for a minimum annual harvest of 1,000 tons, on which the State collects 10c per wet ton.

UTAH

Texas Gulf Sulphur announced June 1 favorable results from its first test well on potash leases in southeastern Utah. The well was completed one month following the signing of an agreement under which Texas Gulf will acquire and commercially develop the extensive Utah potash properties of Dehli-Taylor Oil Corporation. The latter will retain a 25 per cent interest, as has been reported here.

"The test results were consistent with earlier estimates of the thickness and grade of the potash strata," according to Claude O. Stephens, president of Texas Gulf. A second well is now near the coring stage and a third rig is being moved on location to accelerate Texas Gulf's test program. The drilling is taking place in the Cane Creek Anticline area.

Texas Gulf used compressed air rather than mud as the drilling and coring medium. This is believed to be the first successful use of air in the coring of salt and potash. This technique speeded drilling, eliminated leaching and led to 100 per cent core recovery in the potash zone.

EL SALVADOR

Phoenix-Rheinrohr, Dusseldorf steel maker which is participating in the \$12,000,000 fertilizer plant going up

in Colombia, is duplicating the picture in El Salvador.

Both plants are due in production by the middle of next year. Together they will supply half the Colombian market, as well as the entire needs of Panama and the common market group of El Salvador, Costa Rica, Guatemala, Nicaragua and Honduras.

Phoenix-Rheinrohr visualizes a chain of such plants, with investments running to \$100,000,000, which will serve Argentina, Brazil, Peru and Ecuador.

ENGLAND

Imperial Chemical Industries plant at Severnside, which we listed last month as planned to turn out 100,000 annual tons was obviously meant to read 100,000 tons. Our printers and proof readers faces are red. Thanks to a good reader who spotted this slip almost the same day the book came out.

GERMANY

Rheinische Braunkohlen Kraftstoff of Wesseling has under construction a urea plant slated to produce 25,000 annual tons when completed.

INDIA

J. C. Carlile Corp., Denver, USA, built the Valley Nitrogen plant at Helm, Cal. A while back S. K. Patil, India's minister for food and agriculture visited Helm. Carlile are now negotiating the construction of an integrated complex fertilizer plant in India.

KOREA

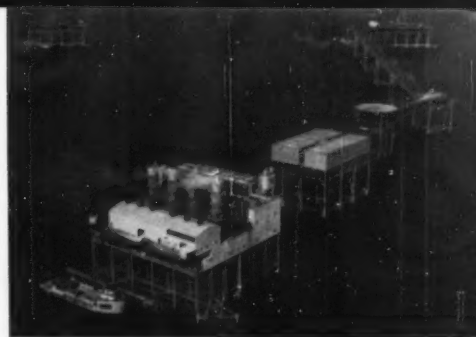
Honam Fertilizer Company, which has undertaken the construction, on behalf of the government, of the \$23,500,000 Naju plant, will be hampered in its progress unless capital subscriptions come in to finance the 85,000 annual ton urea fertilizer plant.

MEXICO

Petoleos Mexicanos within two years expect to have in operation 28 plants which will turn out more than 500,000 annual tons of fertilizer materials and fertilizer. Pemex is oil agency for the Mexican government.

MOZAMBIQUE

Amoniaco Portuguese, through a subsidiary, will erect an ammonia and fertilizer plant at Lourenco Marques.



GRAND ISLE BEGINS OPERATION

Commercial operation has begun at the world's first offshore sulphur mine—the largest steel structure ever erected in the ocean. Located seven miles off the coast of Louisiana in the Gulf of Mexico, the one-half-mile-long structure is the principal part of a \$30 million Freeport Sulphur Company project to mine a major new sulphur deposit known as Grand Isle. Units of the island are: the heating plant where boilers, air compressors, pumps and generators supply the necessary mining "tools"; the employees' housing facilities which can accommodate 120 men and contain TV and recreation rooms, kitchen, cafeteria, first-aid room and offices; a heliport; and at the far end, the drilling and production platform. The separate drilling installation at the left sinks wells to relieve the ore body of excess mine water.

PAKISTAN

Madras will have three fertilizer plants about a year from now, all in the private sector, which will almost meet the 200,000 annual ton demand for superphosphate. Meanwhile the government is hoping to get extra superphosphate from other parts of India whose programs are further along.

IRAN

About 20 miles north of Shiraz, a \$29,000,000 fertilizer plant is under construction by British and French firms. When complete it will be capable of 350 daily tons of ammonium nitrate and 180 of urea.

AT CALSPRAY DEDICATION

Pulling a switch to start operations at California Spray-Chemical Corporation's multi-million dollar plant food plant in Kennewick, Washington, are l. to r.: Governor Albert D. Rosellini, Washington; Agnes Lee McConnell, who modeled the 'stylish Ortho sack dress'; Governor Edmund G. Brown, California; Governor John Burroughs, New Mexico. The occasion was the official plant dedication May 17 attended by several hundred civic, press and broadcasting notables from the Northwest.





Above: Piedmont Liquid Fertilizer plant at Matthews, N. C., as viewed from railroad tracks alongside the plant.
Below: Owner Joe Buice standing at plant door, giving thought to plans for next season. (Commercial Fertilizer staff photographs.)

How can a liquid fertilizer plant, using diammonium phosphate as a base material, compete with solid fertilizers in the heart of the 'cheap superphosphate country'? Your editors had been wondering about this ever since Joe Buice started making liquid mixed fertilizers two years ago at Matthews, N. C., on the outskirts of Charlotte.

But there hadn't been much doubt in Joe Buice's mind. As a dealer for Dixie Guano Co., Joe had watched nitrogen solutions gain a strong foothold in North Carolina and in nearby South Carolina. So why not complete liquid fertilizers?

After examining the capital requirements and the delivered cost of materials required for conventional liquid mixed goods produced by acid neutralization of ammonia, he decided to try a different approach. Joe believed he could come out with about half the usual capital investment if he built a simple-dissolution liquid mixing plant . . . and readily-soluble diammonium phosphate was available from Tennessee Valley Authority in limited quantities for experimental and educational purposes.

Leasing property alongside the railroad siding where his direct-application nitrogen solutions storage tanks were located, Joe Buice hired a couple of workmen and set out

different approach

Diammonium Phosphate makes liquid fertilizers at North Carolina plant

building his low-cost plant. He had a six-ton batch reactor vessel fabricated from mild steel, and recessed it in the ground so that its upper edge was level with the concrete floor of the structure.

A simple wooden hopper on a beam scale was positioned beside the tank well to feed in the solid materials. Half of the reactor tank mouth was covered with a platform, and a small solutions tank was mounted on the platform, directly over the reactor tank.

A motor-driven double-propeller agitator, a water feed pipe and meter, and a discharge pump completed the equipment. This, along with the tractor shovel aisleway, occupied about a third of the building, with two walled-off solids-storage bins taking up the remainder of the space.

Outside the building, a wooden dock gives floor-level access to rail cars that bring the solid materials, and a small office is located on the end of the dock away from the rail siding.

Two outdoor storage tanks complete the physical equipment. A 12,000-gallon vertical aluminum tank fabricated by General Metals stores nitrogen solutions, and a 6,000-gallon mild steel tank built by Buffalo Tank holds liquid mixes ready for shipment. The aluminum unit is generally filled with Allied's 'Uran' which is sold for direct application, as well as being used in the mixed liquid formulas, and the steel storage tank holds 5-10-10.

A pump mounted on the concrete footing for the solutions tank loads trucks or delivery tanks directly or transfers the solutions to the small indoor tank to be fed into the reactor vessel. Most of the liquids transfer is handled in plastic hoses, suitable for both the nitrogen solutions and the slightly-acid liquid mixed grades.

Processing of mixed goods is relatively slow, with the usual five-ton batch requiring an hour for com-

pletion. After the necessary water is metered into the reactor tank, the potash is added and put into solution before the diammonium phosphate (21-53-0) is introduced. Nitrogen solution is added at the same time as the diammonium phosphate. Experiencing some difficulty getting the potash into solution, especially in early-season months when the water is cold, Joe Buice has suspended an immersion heater into the tank to try to bring the temperature up to about 85° F and accelerate dissolution.

Joe believes operating costs — electricity in particular — are fairly high for his plant and estimates this cost at 72 cents per batch. This, however, is no big factor, as output of liquid mixed formulas is approximately 600 tons a year, consisting principally of 5-10-10, 8-8-8 and 4-8-12 for farm crops and 12-6-6 for lawns. 15-5-5 and 14-7-7 have also been produced experimentally for the lawn applications.

All samples examined by the state control office (75% are pulled from the storage tanks or mixing vat, and the remainder are drawn from delivery truck or applicator) have met or exceeded guarantees, the owner says, although no attempt is made to overformulate, other than rounding-off fractions to whole numbers.

In addition, Piedmont sells about 325 tons of non-pressure direct-application nitrogen solutions annually.

Most of the tonnage is applied to small grains, pastures and corn, with emphasis on top-dressing for corn. Spray nozzles are used for cultivated land, dribble nozzles for pastures, and Piedmont applies 75% of the goods it sells, lending equipment for another 15-20% of the application. Selling direct, without dealers or distributors, Joe Buice holds his payroll to one employee plus two half-time farmers who help with application. Distribution is confined for the most part to a 20 or 25 mile radius, but they will deliver up to 40 miles for a big order.

Application equipment is a combination of General Metals and John

Blue units. Truck application rates are controlled by a metering pump driven off the wheel, with a double chain tightener (one on each side). Dye marker is used for straight swaths.

One additional customer service offered by Piedmont is sowing lespedeza seeds simultaneously with top-dressing grains; this is done with

an engine-driven seed spreader pulled behind the tractor, with a hopper capacity adequate for five acres.

Their big season for liquid mixes is early February to mid-May in the spring, and late August to mid-October in the fall. Most of the liquid nitrogen moves between early February and late April and between mid-June and mid-July.

Joe Buice has done just exactly what he set out to do: get into liquid mixing on an experimental basis at the lowest possible outlay. If the business is really 'going' after five years, he says, he'll open a bigger plant, with a phosphoric acid-ammonia neutralization set-up, in a better farming section farther from urban Charlotte.

1. Diammonium phosphate storage bin holds about 1½ cars of material.
2. Other storage bin is filled with fine white muriate of potash. Both solid materials are unloaded from box cars and carried into bins by tractor shovel.
3. Tractor shovel work area has immediate access to both solid materials bins, one located at back end of building, the other on side away from rail siding.
4. Single solid-material feed hopper is mounted on beam scale platform, has full-width feed gate and chute (for maximum dispersion) discharging directly into mixing tank at right; tractor shovel fills hopper from left, at upper end of steeply-sloping hopper bottom.
5. Other processing equipment is also simple. Meter is for water. Calibrated tank barely visible at top holds solution for supplementary nitrogen. Motor directly below tank is agitator drive. Pump at right

moves liquid mixture from sunken mixing tank to outdoor storage tank or truck.

6. View, from above, down into mixing vessel shows coils of immersion heater (suspended by rope into tank), water feed pipe (extending from elbow down into tank), and double-propeller agitator lifted just above surface of liquid.

7. Applicator truck with 21-foot spray boom across front; applicator trailer coupled to hitch on back. Vertical tank at rear is 12,000-gallon aluminum storage vessel for nitrogen solutions.

8. Tractor applicator is transported on Army surplus trailer, once a part of a portable water distillation unit.

9. GI truck, also acquired with portable water distiller, now carries lawn-fertilizing equipment. Liquid mixture from smaller tanks at front is diluted in large tank for lawn application.

(Commercial Fertilizer staff photographs.)

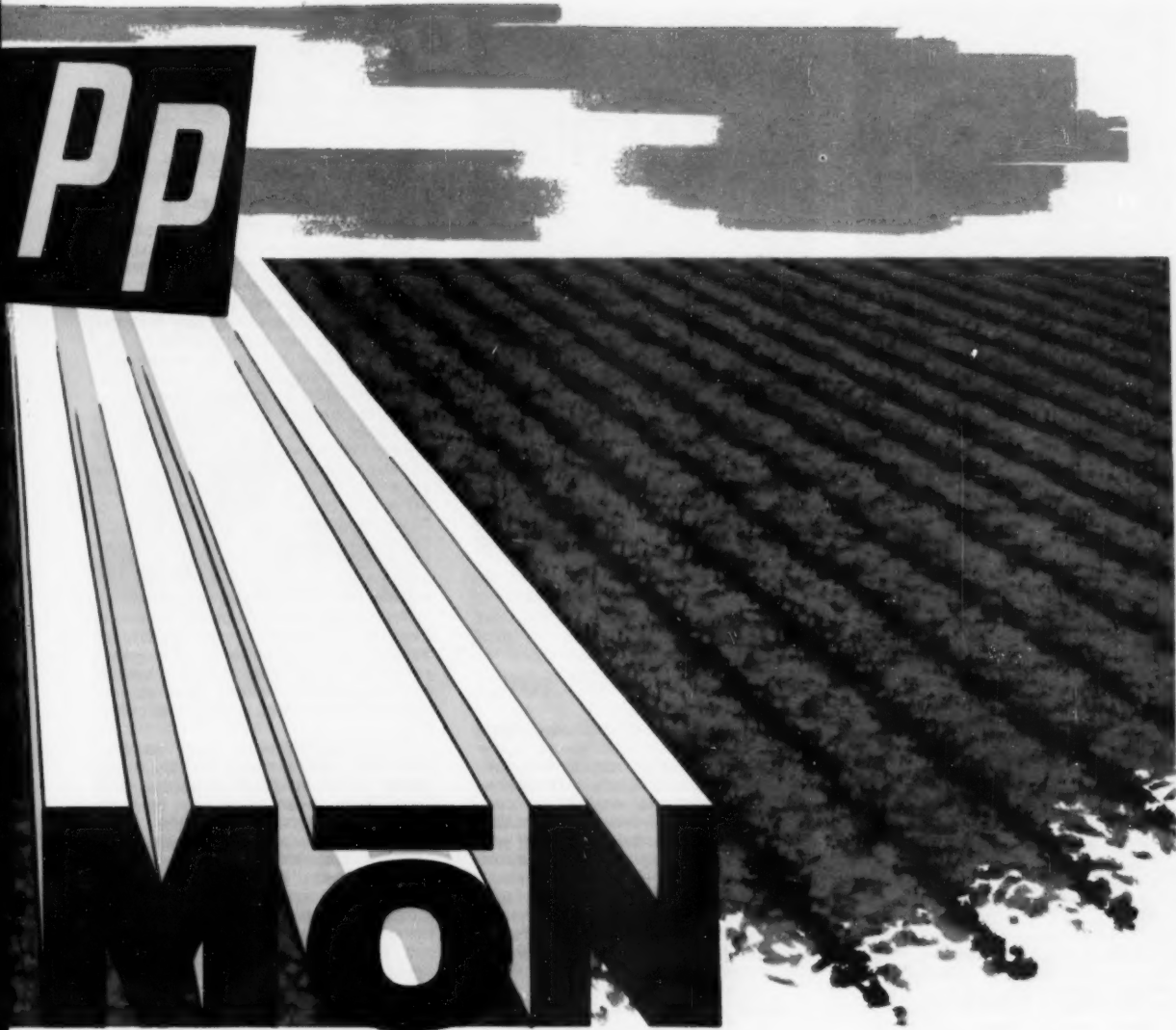




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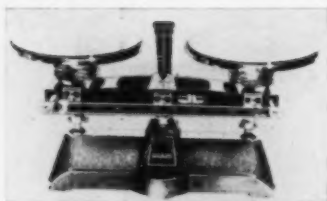
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New Single Beam Balance

Ohaus Scale Corporation announces addition of a new item to their line of Harvard Trip Balances. This new single beam balance has a beam graduated in both metric and avoirdupois weighing standards. This balance was developed to be appropriate for No. 0225 as specified in Council of Chief State School Officers 'Purchase Guide.' The metric graduations are 28.4 gram by 0.2 gram and the avoirdupois graduations are 1 ounce by 0.01 ounce. The balance is available as Model 1454 with 6" diameter Opal Glass plates or as Model 1454S with 6" diameter Stainless Steel plates. Both models list for \$25.00.

The many features of other Ohaus Harvard Trip Balances such as self-aligning bearings, box-end beams, recessed balance adjustment nuts, relief etched stainless steel beams, sliding type poise, and angle view dials and beams are found in this new balance. Base is equipped for use in specific gravity weighing. It finds use in educational, laboratory, and industrial applications.

Descriptive literature is available by circling number 1 on CF's Information Service card, page 47.

Bulk Blending Brochure

Fertilizer Engineering and Equipment Company, Inc., announces availability of its bulk blending package brochures: #32, equipment only; #200, equipment and building; #654, a combination bulk-blend warehouse operation.

The brochures contain engineering improvements, descriptions, dimensions, details and prices. Other features include a centralized control point; building data and information on turnkey contracts.

For complete information, circle number 2, and write brochure number(s) desired in top margin of CF's Information Service card, page 47.

Improved Nozzle

Three improvements on the #210 Nozzle are described in new Bulletin F-210, from OPW-Jordan. Better design, higher flow and longer life are achieved with the improvements. Bulletin F-210 describes how a design change permits head-on filling in corner areas and in all close clearance positions. Higher flow rate, achieved by redesigning flow areas, permits faster tank filling, cuts costs, saves money. Larger drag lugs, which protect nozzle if dropped, and prolong life, are also described. Other features, flow chart, capacities, temperature ratings, materials of construction, sizes and prices are also included.

For copy of Bulletin F-210, circle number 3 on CF's Information Service card, page 47.

FREE LITERATURE ON EQUIPMENT MATERIALS AND SUPPLIES

Dry Processing Catalog

Newest information on Sturtevant Mill Company's full line of dry processing equipment is contained in the firm's 1960 dry processing equipment catalog, made available last month.

Illustrated with photographs, flowsheets, tables and graphs, the eight-page booklet contains information on Sturtevant's air separators, blenders, mixers, Micronizer fluid energy grinders, Pulver-Mill impact grinders, other crushing and milling machines, dens, elevators, granulators, screens, laboratory equipment and other machinery and accessories.

For a copy of the new catalog, circle number 4 on CF's Information Service card, page 47.

Liquid Relief Valves Catalog

A new 28-Page Liquid Relief and Special Service Safety-Relief Valve Catalog, in color, has been published by Farris Engineering Corporation.

This new catalog describes and illustrates the complete Farris line of Safety-Relief Valves for marine service, fire pump service, hydraulic pressure systems, liquified gases, chemical corrosive service and general industrial service.

A new series of low cost, compact, Safety-Relief Valves is cataloged for the first time. Useful sizing information, capacity tables, weights and dimensions, and application data are arranged in a new format which greatly simplifies valve selection.

In addition to liquid relief and special service valves this new catalog provides brief descriptions of all other Farris products including: Safety-Relief Valves, Flexible Valves, Hydraulic and Pneumatic Test Equipment, Steam Traps, Universal Take Off Machine and Fuel Economizers.

For a copy of this new 28-Page Catalog, circle number 5 on CF's Information Service card, page 47.



Pull-Type Spreader

Hatfield 'Roto-Werl' Spreader Corp. announces introduction of a new 'Agricultural Model' spreader. Similar to Roto-Werl's original model in outward appearance and principle of operation, the Agricultural Model has been increased to 3 feet 9 inches in height, employs a different wheel bearing system and tire size (600 x 12).

As its companion model, the new spreader combines time-saving speed (10 acres per hour) with accurately controlled spread rate and an even spread pattern. The unit's effective coverage swath of up to 35 feet, depending upon the density of the material used, is three times that possible with other types of spreader mechanism. Open design of its distribution rotors eliminates clogging, and positive action delivers a unique 'double umbrella' pattern which effectively eliminates gaps and 'clumping' in the spread coverage. An 8-foot hopper carries up to 1500 pounds, cuts down refilling.

The manufacturer cites several features contributing to the durability of the machine: stainless steel flow gates; no gears, chains, or belts used in construction of the rotor drive; sealed rotor bearings; cast aluminum rotors; roller wheel bearings; 14-gauge welded steel hopper.

For a descriptive fact sheet, circle number 6 on CF's Information Service card, page 47.

Table Feeder Bulletin

A two-color, four-page bulletin covers data on the new Omega Table Feeder, manufactured by B-I-F Industries.

Features, advantages, description and operation, feed range and capacities, accessories and dimensions... all are covered in detail for this feeder, Model 0050-04.

For free copy of Ref. No. 50.20-2, circle number 7 on CF's Information Service card, page 47.

Control Valve Catalog

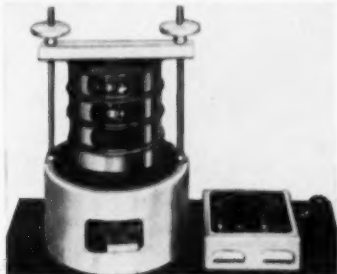
P-K Paul Control Valves of unique Venturi-ball design are described in a new catalog issued by General Kinetics Corporation. The 16 page catalog presents engineering, specification and purchasing information on the complete line of cast, barstock, and special valves, which are supplied in sizes from 1/4" to 14", for pressures from high vacuum to 50,000 psi, and temperatures, from -425°F to 1800°F. The valves are supplied with all types of control and positioning equipment and are suitable for the control of virtually all types of liquids, gases, vapors, and slurries.

Catalog GV-101 is available by circling number 8 on CF's Information Service card, page 47.

Laboratory-Size Vibrating Screen

The new Bartlett-Snow Type CDP 8-in. circular screening unit, designed for research laboratory, production-control labs, and pilot-plant use, features unusually quiet operation. In addition, it is readily carried by one man, weighing only about half as much as comparable units.

The CDP Screening unit features a unique vertical-horizontal pulsating action that assures fast, fine screening. The pulsating action is provided by two independently driven rotating shafts operated at adjustable speed differentials. Each



motor is rheostat controlled so the pulsating action can be readily adjusted for different materials. The Wettlaufer-developed pulsating action screens most materials almost instantaneously and keeps the screen cloths clean.

When used with standard sieves and pans without spouts, the CDP 8-in. screening unit provides rapid analysis of measured batch samples. When equipped with sieves fitted with spouts, the unit is useful in production control for analysis of larger samples by continuous operation—or for continuous screening and recovery of valuable materials.

This unit is ideally suited for screening granular, crystalline, powdery, or other dry materials, even through 200, 325, and 400 mesh. In addition, it gives excellent results screening slurries and fluids. Even when operated continuously, there is no blinding of the screens.

There is no vibration in the base, so the unit can be set on any table or bench. Motor operates on DC or 25, 50, or 60-cycle AC current. The

unit is also available in 12 and 18-in. sizes.

For additional information, circle number 9 on CF's Information Service card, page 47.

Railway Track Scales

Cardinal Scale Manufacturing Co. announces publication of their Bulletin #B-116-MC, describing the all-steel fabricated Murphy-Cardinal Railway Track Scales.

These units are designed and manufactured in accordance with A.R.E.A. Specifications, for installation with either full floating, rigid concrete, timber, or steel plate deck, and are equipped with double link suspension, which eliminates platform shock, saves wear and tear on the pivots and bearings and prolongs the useful life of the scale.

The Murphy-Cardinal Railway Track Scales are manufactured in standard capacities of 120-tons through 200-tons, with platform sizes of 50' x 10' up through 110' x 10' as standard.

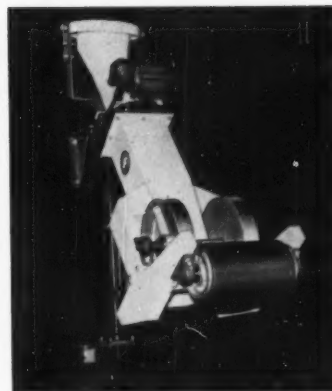
Other platform sizes and capacities to 750-tons can be supplied as special units to meet individual customer requirements.

For additional information, circle number 10 on CF's Information Service card, page 47.

New Booklet on Hazards

Foster D. Snell, Inc., has released a new booklet discussing the measurement, detection, correction, and litigation of casualty, fire, pollution, and product-liability hazards. The booklet stresses prevention of these hazards by means of plant appraisals, precautionary labeling, toxicological testing, etc. It also emphasizes the need for promptly calling in an expert in the investigation of industrial accidents when a mishap occurs, for any delay may occasion the loss of key pieces of evidence needed in later litigation, which only the expert is qualified to recognize and evaluate.

Copies of 'Hazards' which is written with insurance adjusters, plant safety officers, engineers, and others interested in the mitigation and avoidance of accidents in mind, are available by circling number 11 on CF's Information Service card, page 47.



New Box-Car Loader

Now in production is a new, modern centrifugal-action, bulk material handler that makes the loading of even the largest box-car an effortless, one-man task. The 'Flinger' loader-piler can be had in four styles and nine models from the newly formed Conveyor Division of Finco, Inc.

Designed to handle practically all dry bulk materials, the Flinger utilizes a short, high-speed rubber belt to increase the velocity of falling material in the feed-spout. As the belt flexes over a pulley, material is flung in a compact stream accurately as directed, and with less than the expected amount of dust.

Commonly hung on a track-side wall or structural member where loading docks are not feasible or possible, the Flinger is also manufactured as wheel-mounted type that can be moved where and when required. In addition the machine is made in models that mount at the head-end discharge point of permanent or portable conveyors.

For additional information, circle number 12 on CF's Information Service card, page 47.

Fluid Flow Rate Alarms

New Bulletin #175, now ready for distribution from Brooks Rotameter Company, gives details and examples of rotameter accessories to provide signalling and simple control functions. Copies are available by circling number 13 on CF's Information Service card, page 47.

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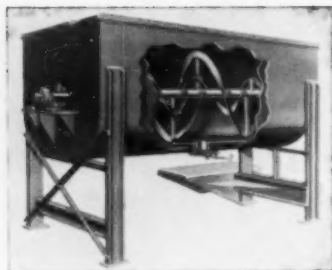
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Ribbon Blenders

A complete line of ribbon blenders featuring automated control and pre-engineering has been announced by Tower Iron Works. Designed specifically for fast accurate blending of powders, pastes and liquids, these blenders are pre-engineered to reduce initial cost and custom service selected to insure suitability to specific requirements. With the automatic program control board all auxiliary equipment for the cycle can be set into operation individually or in sequence saving valuable operator time.

Another feature of these blenders is Tower's 'Tri-Mix' action, a development combining self-reversing flow with top to bottom turnover assuring perfect blending action without stratification.

Available in all sizes, Tower ribbon blenders can be fitted with a choice of four different agitators.

For more information, circle number 14 on CF's Information Service card, page 47.

Pressure Regulator Catalog

Now available from OPW-Jordan, new 8-page Catalog J160-1 gives up-to-date information on the complete line of Sliding Gate Pressure Regulators. J160-1 describes in detail the OPW-Jordan self-operated, pilot-operated, solenoid operated and back pressure regulators. Sliding gate regulators are designed for use on steam, water, air, oil, gas or corrosive chemicals. The catalog describes the applications of each of the four basic types of regulators and how each type works. The self-cleaning, self-lapping action of the sliding gate seat is clearly illustrated. J160-1 also explains how sliding gate construction gives straight through flow. The catalog has features, cutaway drawings, siz-

ing charts, flow curve, sample specifications and complete engineering information.

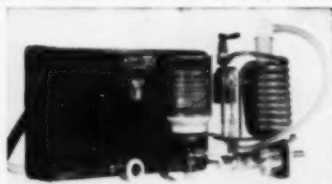
For a free copy, circle number 15 on CF's Information Service card, page 47.

Constant Rate Air Sampler

A new simplified air sampling device small enough to be held in one hand, has been perfected by the Du Pont Industrial Hygiene Lab, to help industrial hygienists, air pollution and safety experts to determine what harmful substances might be in the air.

Weighing less than 4 pounds, the new device substitutes a miniature jet engine powered by a can of low-pressure liquefied gas for heavy, bulky, hand or motor driven pumps. Other than an 'Instant Action' control valve, the Constant Rate 'Uni-Jet' contains no moving parts.

Use in explosive or hazardous environments is not restricted, as the



Uni-Jet does not depend on electrical circuits or moving mechanical parts.

Typical chemical pollutants which can be determined with the instrument include acid fumes, nitrogen oxides, sulfur dioxide, toluene, diisocyanate, phosgene, and hydrogen sulfide.

For dust sampling, where a particle count or radioactivity survey is desired, a standard filter attachment is substituted for the glass impinger. Dust particles caught on the special filter paper are then counted or measured in microanalytical equipment.

For complete information, circle number 16 on CF's Information Service card, page 47.

New Bellows Flowmeter

A new metallic Bellows Flowmeter has been introduced by Fischer & Porter Company. This differential pressure measuring device can be used for both flow and liquid level applications. It is accurate within 1/2 of 1 percent using no mercury,

seal-pots, purges or stuffing boxes. The meter body is completely self-draining and self-venting and is rated at 2000 and 5000 psig in steel and stainless steel. The flowmeter has ranges from 0-20 to 0-300 inches of water and may be changed by a simple exchange of the range spring assemblies.

This indicating and/or recording instrument can be equipped with a controller, totalizer, or with a pneumatic or electric transmitter. Additional pressure and temperature indicators or pens are available.

For additional information circle number 17 on CF's Information Service Bureau card, page 47.

Variable Speed Drives

'Types RS P.I.V. Variable Speed Drives,' a new 6-page Folder 2874, describes Link-Belt Company's new constant horsepower variable speed drives, designed to meet capacity demands up to 50 horsepower and ratios up to 5.5:1.

The folder describes the new features of a twin-strand single roll chain that operates between a pair of smooth facing wheels to change the ratio and output shaft speed as the effective diameter of the wheel faces is altered. In this manner stepless speed adjustments between maximum and minimum settings are achieved.

Applications for the new drives include smooth, precise speed control for heavy machine tools, timing, mixing, synchronizing, conveying and handling systems.

Folder 2874 also illustrates types of assemblies and sizes available, speed variation ratios and selection data. A copy can be had free by circling number 18 on CF's Information Service card, page 47.

Teflon-Lined Valve

A completely new line of chemically inert, corrosion-resistant solenoid valves, with molded bodies made of Teflon, have been developed by Valcor Engineering Corporation. The new valves are shock resistant, pressure proof and claimed to outlast and outperform steel in virtually any corrosive medium now used in American industry.

These valves with bodies made of Teflon are stated to be ideal for critically corrosive and abrasive applications where complete dependability is essential. They are de-



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signed for normally closed applications in all normal AC and DC voltages.

For complete technical information on Valcor solenoid valves made of Teflon, circle number 19 on CF's Information Service Bureau card, page 47.

Flexible Bin Level Indicators

Two new Bin-Vue level indicators with flexible shafts—standard and explosion proof—have been announced by Convair.

These new Flexi-Shaft models will solve what has been a continual problem for companies using large bulk bins for storage where materials often build up along the sides of such bins. Although this build-up usually forms a funnel of static material and permits a free flow of materials in the center, it makes



level control inaccurate and unreliable, but the top-center-mounted Flexi-Shaft Model Bin-Vue assures control at any desired level.

Bolted in place, the Flexi-Shaft indicator's 1/100 hp motor turns a 4-blade paddle by means of a torsion spring. The paddle turns continuously as long as no material touches it.

If material makes contact with the paddle, it stops. However, the motor continues to run, expanding the spring until it actuates a limit switch. This switch turns off the motor and any other equipment controlled by the Bin-Vue. When the materials fall away from the paddle, the torsion spring reactivates the paddle and unwinds from the limit switch, starting the motor and putting the unit in operation again.

For further information, circle number 20 on CF's Information Service card, page 47.

Graphite Diaphragm Valves

Three modifications of Impervite impervious graphite Diaphragm Valves are covered in this new five page catalog, including actual photographs of the units, engineering drawings and dimensions, as well as charts showing Cv factors for each size.

These valves utilize Impervite impervious graphite bodies with Hills-

McCanna (Saunders Patent) bonnet assemblies. Corrosives contact only the impervious graphite, and the Teflon diaphragm, normally used. These valves are recommended for service with all corrosives except a few highly oxidizing agents. They are immune to effects of thermal shock, are non-contaminating, accommodate operating temperatures to 340°F. and operating pressures to 50 psi.

Impervite diaphragm valves are furnished in seven sizes from one to eight inches in diameter. In the larger sizes they can be totally steel encased if desired. Bulletin No. 1610 is available by circling number 21 on CF's Information Service card, page 47.

Liquid Fertilizer Stabilizer

Stabilization of liquid fertilizers is the subject of a new technical data sheet just published by Minerals & Chemicals Corporation of America. The booklet describes the use of 'Attigel 30,' a colloidal grade of Attapulgit, as an agent for the suspension of plant nutrients in water.

Three-hole punched for loose leaf filing, the bulletin completely describes how the use of Attigel 30 helps to overcome analysis and uniformity problems in liquid fertilizers. Types of fertilizers with which it has been successfully employed are presented.

The 8-page data sheet also discusses how the material is used and gives detailed specifications for the limited amount of process equipment required. Also given are six typical liquid fertilizer formulations in which Attigel 30 has been used successfully. Properties of the new material are presented in chart form.

Technical Data Sheet T. I. 959 may be obtained without cost by circling number 22 on CF's Information Service card, page 47.

Variable-speed Drive Book

A new 16-page, two-color catalog of 'Zero-Max' stepless variable speed drivers for fractional horsepower applications is now available free from the Zero-Max Company.

Typical applications are both listed and pictured. Operating features and installation suggestions are accompanied by numerous diagrams and tips on power transmission.

Details on all types of units, with or without motor, in the new '400 Series' of 'Zero-Max' variable speed drives are complete and well-organized. Charts and diagrams answer virtually every question on the use of mechanical variable speed.

For your copy of Catalog 400C560, circle number 23 on CF's Information Service card, page 47.

New Palletizer

A new pallet loading machine permits high speed one-man loading of standard pallets for transporting by fork lift truck. Developed by the Power-Curve Conveyor Company, the powered turnable station is used

with a standard Power-Curve flexible loader and swivel stacker. Bags are power propelled into position on the pallet with the machine operator guiding each bag, using any palletizing pattern.

When a pallet is loaded, the turntable is power-rotated to position a new pallet while the loaded pallet is removed by fork lift. More than 1000 bags an hour can be palletized by one man. The bags can be glued automatically to prevent shifting on the pallet. The complete installation is said to be less than half the cost of other machinery intended for this service. The system is described in Bulletin No. 30, available by circling number 24 on CF's Information Service Bureau card, page 47.

Conveyor Chain Bulletin

Publication of a new 4-page bulletin, number 6061, on its Rex line of flat-top conveyor chains has been announced by Chain Belt Company.

Bulletin 6061 contains information on newly-designed Rex Steel TableTop that is claimed to be the most precise flat-top chain available in the hinge-type, interlace link category. It also carries information on Nylon TableTop—a lightweight chain that provides long life and smooth carrying services without lubrication.

In addition, the new bulletin outlines operating advantages of its other flat-top chains which include: Steel and Nylon PlateTop roller chain; FlexTop that curves around sharp corners—and up and down moderate inclines; and heavy-duty Crescent Top for carousel-type conveyors.

For your free copy of bulletin 6061, circle number 25 on CF's Information Service card, page 47.

Slide Gates

Literature descriptive of a complete line of slide gates has recently been issued by The Bucket Elevator Company. They are designed for attachment to existing duct work, hoppers, screw conveyors, bucket elevators or other process machinery to control or shut off the flow of bulk materials.

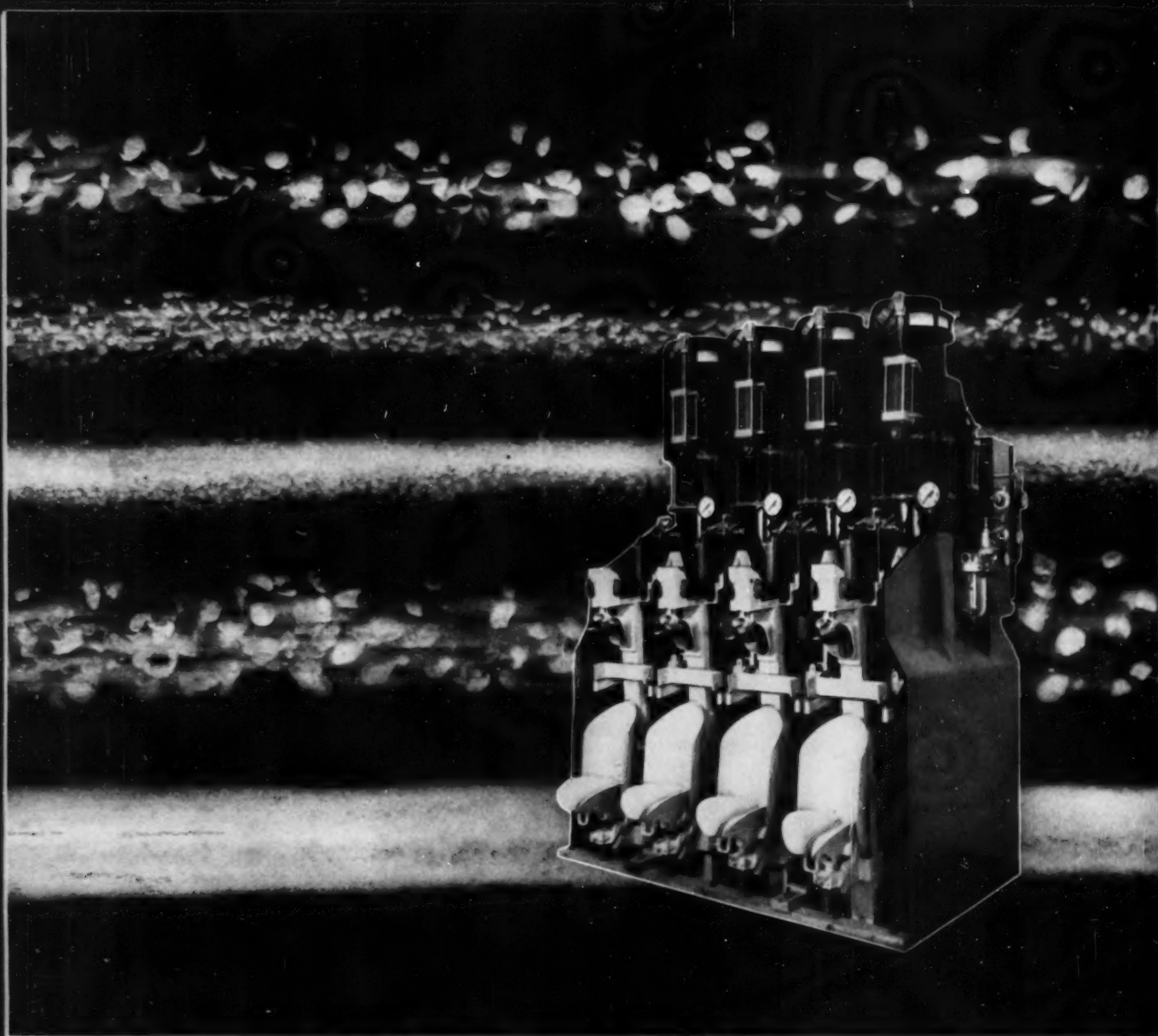
Slide Gates feature a cut-out extension which matches the flange openings when the gates are full open. With this arrangement the



track is always filled with a part of the blade affording smooth operation at all times.

'Buck-El' Slide Gates are available in stainless or carbon steel in a wide range of sizes. Basic types include hand operated, rack and pinion operated or air operated.

For complete information, circle number 26 on CF's Information Service card, page 47.



The new St. Regis® FORCE FLOW® packs anything from pellets to pulverized goods!

Now *one* machine—the new St. Regis FORCE FLOW valve bag packer—can be used to pack fertilizer products with widely different flow characteristics, structure and size. Whether it's pulverized or granular goods, this *one* machine will pack it with accurate weights into smaller, cleaner bags.

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cial and specialty grades • Excellent weight accuracy • Reduced dusting and spillage • Easier to operate • Lower maintenance costs.

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Safety Executive Committee Considers Important Topics

The executive committee of the Fertilizer Industry Safety Section took action on several far-reaching measures in a meeting at Raleigh, N. C. June 9.

Plans were laid for the final series of regional supervisory safety training schools, completing a three-year program sponsored jointly by the Section and the National Plant Food Institute.

The committee also discussed and approved the agenda for the Fertilizer Section's Sessions during the National Safety Congress at Chicago in October. In the absence of immediate past chairman George Pelton (Smith-Douglass Co., Columbus, O.), chairman Elmer Perrine (Allied Chemical Corp., Nitrogen Div., New York) introduced the slate of candidates to be placed in nomination at the fall meeting. They are: chairman, Ansel I. Raney, Phillips Chemical Co., Bartlesville, Okla.; vice chairman, Gaither T. Newnam, Smith-Douglass Co., Norfolk, Va.; and secretary, John Mark, Farm Bureau Federation of Ohio, Columbus.

John E. Smith (Spencer Chemical Co., Pittsburg, Kans.) presented a rough draft of a proposed Fertilizer Safety Manual, expected to be completed and available for distribution during 1961. He also revealed some statistics compiled from his own firm's records, which indicated a cost to the company for off-the-job accidents amounting to approximately three times the cost of workmen's compensation.

In the discussion that followed, it was brought out that the Council has approached the Fertilizer Section with the thought of sponsoring an off-job safety movement in the industry, and that the Fertilizer Section is the only National Safety Council industrial section which is not working on a project in this area. The executive committee voted unanimously to recommend appointment of an Off-the-Job committee for the Section at the Chicago meeting in October.

The committee also considered the topic of ammonium nitrate, and adverse publicity erroneously identifying this material as an explosive fertilizer substance.

Informed that the Safety Council was working on a data sheet dealing with the general topic of safe handling of ammonium nitrate used as

a blasting agent, the executive committee voted to request that the Council submit to the Fertilizer Section prior to publication any proposed releases dealing with ammonium nitrate. In this way, it was felt, the Section's Engineering Com-

mittee could block any improper reference to pure ammonium nitrate as a hazardous material.

In the discussion centering around this proposal, the committee considered the possibility of selecting a generic term for the specially prepared carbonaceous ammonium nitrate materials which have gained popularity as blasting agents. National Plant Food Institute president Paul T. Truitt reported that

CF Staff Pictures from Safety Meeting

1. John Mark, Farm Bureau Cooperative Assn., Columbus, Ohio, and Elmer Perrine, Nitrogen Div., Allied Chemical Corp., New York.
2. John E. Smith, Spencer Chemical Co., Pittsburg, Kans.; Paul T. Truitt, National Plant Food Institute, Washington; and A. B. Pettit, W. R. Grace & Co., New York.
3. Marshall Petersen, National Safety Council, Chicago, and Emerson M. Jones, Nitrogen Div., Allied Chemical Corp., Indianapolis.
4. Mike Ellison, Mississippi Chemical Corp., Yazoo City, Miss.; Stratton McCargo, Cooperative G.L.F. Exchange, Ithaca, N. Y.; George Dietz, Fertilizer Mfg. Cooperative, Baltimore.
5. Norman Maddux, Florida Nitrogen Co., Tampa; Ansel Raney, Phillips Chemical Co., Bartlesville, Okla.
6. Quentin Lee, Cotton Producers Association, Atlanta; Grayson Morris, Cooperative Fertilizer Service, Richmond.
7. Billy Creel, North Carolina Dept. of Labor,

Raleigh, and Ed Burroughs, F. S. Royster Guano Co., Norfolk.

8. Jim Smith, Western Phosphates, Salt Lake City, Utah, and Gaither Newnam, Smith-Douglass Co., Norfolk.

9. C. S. Griffith, Virginia-Carolina Chemical Corp., Cincinnati, and Bill Stone, Wilson & Toomer Fertilizer Co., Jacksonville, Fla.



Schedule of Regional Fertilizer Supervisory Safety Schools

NORTHEAST August 10-11 Park Sheraton Hotel New York
Director: Stratton McCargo, G.L.F. Soil Building Service
Terrace Hill, Ithaca, N. Y.

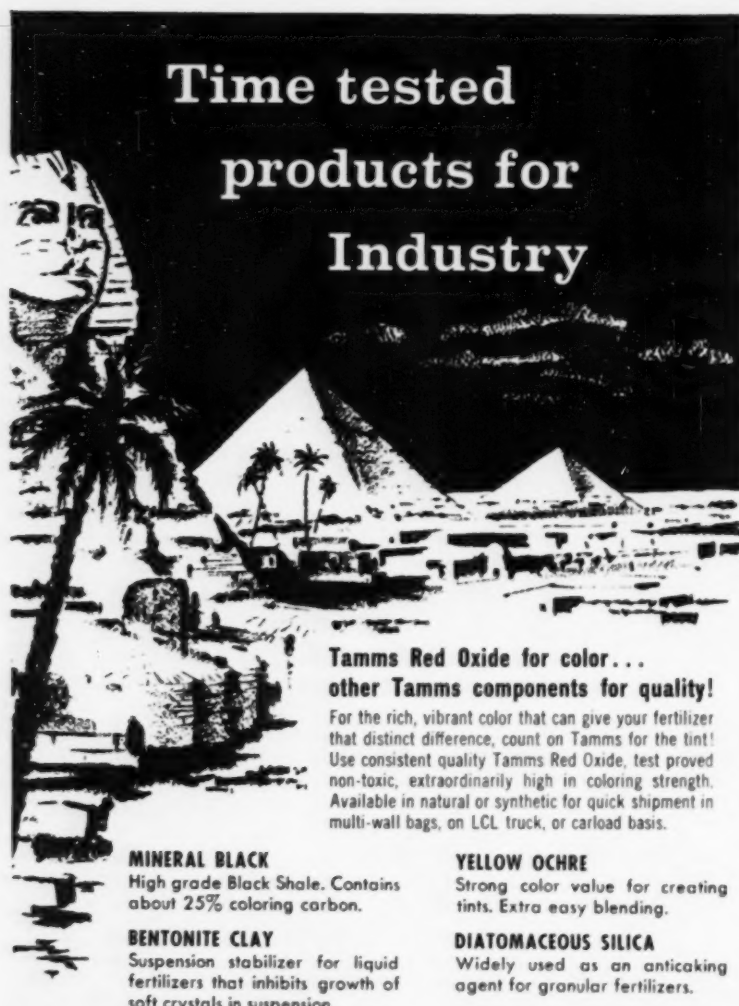
MIDWEST August 16-17 Safety Council Hdq. Chicago, Ill.
Director: Emerson M. Jones, Nitrogen Div., Allied Chemical Corp.
6060 College Ave., Indianapolis 20, Ind.

SOUTHEAST Aug. 25-27 Cape Fear Hotel Wilmington, N.C.
Director: Quentin S. Lee, The Cotton Producers Association
P. O. Box 2210, Atlanta 1, Ga.

FAR WEST late October or early November Hacienda Motel Fresno, Calif.
Director: Austin Cline, Shell Chemical Corporation
P. O. Box 1451, Ventura, Calif.

SOUTHWEST late October (to be announced) or early November New Orleans
Director: to be announced

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much effort had been spent in this direction, but that every one of a long list of potential names investigated had been found to be a registered trade name, although many were not in actual use.

On the brighter side, among the committee reports, membership chairman C. S. Griffith (Virginia-Carolina Chemical Corp., Cincinnati) announced a net increase in membership for the Section.

Fumigant Safety

Kansas State University was host June 2 and 3 to a conference to encourage safe use of fumigants.

The conference, believed to be the first on this subject on any college or university campus, was held at the request of the Kansas State Board of Health and the Kansas Department of Labor. There has been increasing concern over deaths and injuries to health as the result of improper handling and use of fumigants.

Others joining in sponsoring the conference were Kansas State University and the Kansas Grain and Feed Dealers association. Around 300 attended.

Towmotor Safety Kit Reduces Accidents

A plant safety kit aimed at making materials handling operations safer and more efficient in production, storage and shipping areas, by reminding workers of correct operating procedures related to the use of fork lift trucks, is again being released by Towmotor Corporation.

Free copies of the new safety kit may be obtained by writing Towmotor Corporation, 1226 East 152nd St., Cleveland 10, Ohio.

The Smith-Douglass Company, Inc., in Albert Lea, Minnesota, recently received a plaque from the National Safety Council honoring their outstanding safety record. As the sign shows, the plant has been 1,500 days without a lost time accident. M. A. Glass, right, plant manager, presents the award to Gordon Lillemor, second from right, head of the employee safety committee, while other members of the committee observe.



ASSOCIATION ACTIVITIES



New Quebec Officers: Guy Gubbay (center), Montreal district sales manager, William Houde Ltd., who was elected president of Quebec Fertilizers Inc. at the annual meeting of the association at the Mount Gabriel Club. Other new officers (l to r) are: vice president—Harold Barrett, Canadian Industries Limited; executive director—Rene Reid, International Fertilizers; Mr. Gubbay; agronomic committee chairman—Marcel Roy, Canada Packers Ltd. advertising and public relations chairman—Arthur O'Donoghue, Cyanamid of Canada Ltd.

Fertilize for Livestock, Quebec Conference Told

If the livestock industry in the province is to increase and prosper, Quebec farmers must increase the fertility of their soils, Pierre Labrecque of Quebec City told the annual conference of Quebec Fertilizers Inc.

Mr. Labrecque, who is director of the animal husbandry division of the Quebec Department of Agriculture, said that while agriculture in the province is based on livestock production which is the principal source of our farm income, there is insufficient good forage to feed any more cattle because of the poor condition of most of our soil and "very little is being done to improve it."

"We are accustomed to estimate the efficiency of the farms in the Province of Quebec by the number of acres required to feed one unit of livestock," Mr. Labrecque said. "On these terms the number of units which can be kept on a farm depends on the amount of hay and pasture available. But it's not the quantity of hay we are worried about but the quality,—and Quebec hay does not measure up to expectations. Liming and fertilization will improve both quality and yield."

Guy Gubbay, chairman of the agronomic committee, reported that Q. F. I. started off 1959 with only 39 pasture demonstration plots and at the beginning of June of this year the association had 101 under

its supervision. Fertilized plots, he said, showed an average return of \$3.16 in increased milk production for each dollar spent on fertilizer and the average revenue per arpent of fertilized pasture was \$147.04 against \$96.08 from non-fertilized check plots.

Canada Meet August 21-25

From H. H. Skelton, convention chairman of the Canadian Fertilizer Association:

"This is a preliminary notice to our friends in Canada and the United States to remind you of the dates for our 15th Annual Convention.

"Many of you are already aware of the many attractions of the Manoir Richelieu.

"The various committees have already started to work to ensure that this year's Convention, both from a business and pleasure point of view, will be a real success.

"Complete details on registration fees, hotel rates, steamer rates from Montreal if desired, registration forms, etc., will be sent you in a few weeks time. Please register through the Association as the Hotel cannot accept registrations direct for our Convention.

"Mark these dates—August 21-25—on your calendar and we will look forward to seeing you at the Manoir Richelieu."

Grassland Council Visits Sohio Plant

High spot of the first day of the annual 3-day conference of the American Grassland Council, June 14, 15 and 16, at Ohio State University, was a bus tour to the plant of the Sohio Chemical Company at Lima, Ohio. This national conference, under the joint sponsorship of the American Society of Agricultural Engineering, drew a large audience to Columbus.

Enroute to Lima, the chartered buses visited the Arthur Burns and Sons Dairy Farm at Milford Center, Ohio, and the C. E. Knowlton beef cattle farm at Bellefontaine, Ohio.

Following a chicken barbeque served by the Allen County 4-H Clubs at the Sohio picnic grounds, the party made a conducted tour of the Sohio Chemical Company plant to see the facilities for the manufacture of nitrogen chemicals for agricultural use. Here they heard a brief discussion on the subject of Sohio Chemical products, what they are used for, who uses them and where they are sold.

Wisconsin to Host Soil Science Congress

Four hundred of the world's leading soil scientists will present research papers at the Seventh International Soils Science Congress at the University of Wisconsin, Aug. 15-23.

The Congress is sponsored by the Soil Science Society of America, in cooperation with the International Society of Soil Sciences.

The research papers will deal with soil physics, soil chemistry, microbiology, soil fertility, soil genesis, classification and cartography, soil technology and mineralogy. An attendance in excess of 1,500 is expected, including soil scientists from all countries having diplomatic relations with the United States.

Three cross-country field tours have been arranged for visiting soil scientists by a committee headed by Dr. Charles E. Kellogg, Chicago, of the National Soil Survey of the U.S.A. The tours will provide an opportunity to study important soil types along the route, the agriculture which has developed from them and the agricultural research and colleges serving each area.

Local tours in the vicinity of Madison are being arranged during the Congress, including an all-day tour, Aug. 18, to the new University Ex-

ASSOCIATION ACTIVITIES...

periment Station and other points of note.

Other tours are being arranged for groups particularly interested in soil classification, forestry, soil management, ecology, glaciation and other natural formations.

Heading the Soils Science Society of America is Dr. J. F. Fitts, North Carolina State College, as president; Dr. Werner L. Nelson, American Potash Institute, vice president; Guy D. Smith, USDA, past president; and L. G. Monthey, executive secretary. Dr. Richard Bradford, Cornell University is president of the International Society of Soil Science. Other officers are: Dr. Charles E. Kellogg, vice president; and F. A. Van Baren, Royal Tropical Institute of Amsterdam, the Netherlands, secretary-general.

Prof. Emil Truog, emeritus, University of Wisconsin, heads the Congress.

SW Fertilizer Conference and Grade Hearing

July 27-30 the Galvez Hotel, Galveston, Texas, will be the scene of the Southwestern Fertilizer Conference and Grade Hearing, the program for which was published here last month.

Kentucky Fertilizer Conference Slated Aug. 3

The annual Kentucky fertilizer conference will be held at the University of Kentucky on August 3, 1960. The morning meeting will begin promptly at 10 a.m. Eastern Standard Time in the Guignol Theater, and the afternoon meeting will

be in the Bluegrass Room of the Student Union Building.

Because of the interest that has been shown in the intensive fertility program that is being conducted in some other states and because such a program is being planned for certain counties in Kentucky, the Industry-College Fertilizer Advisory Committee decided to build this year's conference program around this project.

The program will open with a showing of the movie "Bread From Stone" produced by the National Plant Food Institute, and will be followed by an explanation of the intensive program that is planned for Kentucky.

Luncheon will be served in the Bluegrass Room of the Student Union Building, and the afternoon program will start immediately after lunch.

NW Fertilizer Conference Coming at Salt Lake, Utah

July 13-15, the Utah Hotel, Salt Lake, will be headquarters for the annual fertilizer conference sponsored by the Pacific Northwest Plant Food Association. The program is replete with constructive papers, and the area around Salt Lake is interesting to visitors. The Association suggests you bring along the family, and plan to take the Grand Canyon tours after the conference.

They also warn that the tourist season is on, and you would do well to get reservations in at the hotel and Motor Inn. And be there the evening of the 12th because the sessions start at 9 the next morning.

FORESTRY RESEARCH GRANTS

Six grants for forest fertilization research in the South have been provided by the National Plant Food Institute, Dr. Robert L. Beach, Director of the Institute's Southern Region, has announced.

Principal scientists receiving financial support from the Institute and the studies involved are:

Dr. T. E. Maki, North Carolina State College—to continue studies on the effects of fertilization of forest trees in organic soils of the Southeastern coast.

Dr. Frank W. Woods, Duke University—to initiate experiments on the location of nutrient feeder roots of pines growing in deep sands.

Dr. Louis Metz, Southeastern Forest Experiment Station, U. S. Forest Service, to further investigate the possibility of using foliar analysis as a means of determining the nutritional status of southern pines.

George Sparrow, Tidewater Agricultural Experiment Station, USDA—to continue research on the interaction of fertilizer applications with irrigation and drainage.

Dr. John Hamilton, University of Georgia—to further determine the effects of fertilizer applications on the wood properties of Southern pines.

A fund has been set aside for commercial nutrient analyses of plant tissues.

Dr. Beach requested that inquiries concerning grants for research should be directed to the Institute's Forestry Consultant, Dr. L. C. Walker, University of Georgia, at Athens.

Industry Meeting Calendar

DATE	EVENT	LOCATION	CITY
July 13-15	Pacific N. W. Fertilizer Conference	Hotel Utah	Salt Lake City
July 27-30	Southwest Fertilizer Conference	Galvez Hotel	Galveston, Texas
Aug. 10-11	Northeast Safety School	Park-Sheraton Hotel	New York, N. Y.
Aug. 16-17	Midwest Safety School	Safety Council Hdg.	Chicago, Ill.
Aug. 21-25	Canadian Fertilizer Association	Manoir Richelieu Hotel	Murray Bay, Que.
Aug. 25-27	Southeast Safety School	Cape Fear Hotel	Wilmington, N. C.
Sept. 29-30	Northeast Fertilizer Conference	Hotel Hershey	Hershey, Pa.
Oct. 5-6	Southeast Fertilizer Conference	Biltmore Hotel	Atlanta, Ga.
Oct. 17-18	Fertilizer Industry Safety Section	Morrison Hotel	Chicago, Ill.
Nov. 2-4	Fertilizer Industry 'Round Table'	Mayflower Hotel	Washington, D. C.
Nov. 9-11	National Fertilizer Solutions Assn.	Peabody Hotel	Memphis, Tenn.
Nov. 13-15	California Fertilizer Association	del Coronado Hotel	Coronado, Calif.
1961			
Jan. 11-13	Agricultural Ammonia Institute	Peabody Hotel	Memphis, Tenn.

Dr. L. C. Walker, National Plant Food Institute forestry consultant, has received a grant from the Conservation Foundation of New York to write a new reference text on the silviculture of Southern forests.

The book will grow out of Dr. Walker's work while on assignment for the Institute which carried him to every forest research organization from Texas to the Atlantic Coast. During that time he also visited with many practicing foresters.

The Institute consultant is associate professor of silviculture at the University of Georgia.

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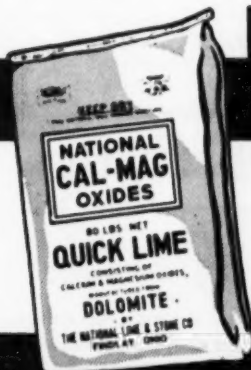
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Modernizing Forestry

Under the caption "The land nobody wanted" Harvester Worlds house-organ of International Harvester, reports on a central Florida area that was developing ghost towns, because drought and floods discouraged farmers who moved out.

"That was 40 years ago. Today the towns are humming with activity again. A new settler—the tree farmer—has moved in. To a nation whose forests once were plundered by decades of careless and greedy cutting, the land that grew "nothing but trees" has become invaluable.

"All over the U.S., it's the same story. Marginal land, good for little else, has been turned into forest with the happy result that, for the first time in history, Americans are raising more wood every year than they're cutting (14 billion cu. ft. vs. 11 billion cu. ft.)

"Much of the credit goes to the tree farmer. He's a fresh breed of logging man—a skilled farmer first, a logger second. To him, trees are not a source of quick profit; they're a carefully tended agricultural crop, a long-range investment.

But it takes more than just the guts to get in there and plant and tend—and wait for results. It takes equipment. So it is interesting to note a paper by William C. Finley of Battelle Memorial Institute, which says this in part:

"For several years there has been a growing feeling among men in the timber-producing and using industries that it is high time that mechanical tree planters were improved. Indeed, economics dictates major improvements in mechanical planters."

Mr. Finley inserts this quote from R. V. Malecki of Union Bag-Camp Paper Corp.:

"Tree planting has become an important tool of intensive (land) management. Continuing improvements are being made to the seedling and the area to be planted. We feel that these improvements should also be applied to the actual technique of getting the tree into the ground. Here is an area where we can get some of our costs in line."

Resuming, Mr. Finley writes:

"While the idea of an improved mechanical tree planter is not new, there seems to be little progress to-

ward making the idea a reality. Today, more than 10 years after the first tree-planting machines were introduced into the South, there has been essentially no change in this equipment.

"For example, during the past planting season one company planted 22,000,000 seedlings on company-owned land. This task required 43 planting machines, 23 crawler tractors, 20 wheel tractors and 91 dibble crews. These considerations, brought to the attention of Battelle Institute by industry foresters and timber men, led our mechanical development group to make an informal preliminary study.

"One important area for improvement that we immediately recognized was the need for a planting machine with its own source of power. With such a self-propelled unit, planting could be done by one man who would ride on the vehicle, guide it, and feed seedlings into the planter mechanism.

Then, too, Battelle's own experience in forestry practice and checks made with timberland operators suggested that there is no reason why the ground between planted trees should be plowed as a part of the planting operation as is now done. A suitable hole in the ground could be made for the planting of each seedling. There are several possible mechanisms which could be used to provide the hole in the ground. A unit of this type could be used to dig a hole approximately 6 inches square and 18 inches deep straight down into the ground.

Another mechanism which could probably be used is a rotating or a drilling type unit which would dig a round hole 6 inches in diameter and 18 inches deep.

To round out the improved tree planter we visualize, a method for setting desired spacing of trees could be built into the planter mechanism, and some method for applying fertilizer or water or both could be developed and made operable on the planter."

And the third big ingredient is plant food. And here are some extracts from a thoughtful paper on the subject, as it applies to the Upper Peninsula, in Michigan. The statements, with modifications made to allow for soil and climate, can

apply in many other parts of the nation:

What are the possibilities of using commercial fertilizer to improve the growth of forest stands in the Upper Peninsula?

In view of the prediction that the nation's wood needs are likely to double by the year 2000, this is a question well worth considering, thinks Roy E. Skog, Marquette, forestry specialist with the U. P. Extension Center of Michigan State University.

"Compared to what we know about fertilizing farm crops, the knowledge of fertilizing forest trees is still very limited," Mr. Skog says. "But through research, progress is being made in forest fertilization, and certain possibilities are becoming evident."

"The possibility of fertilizing forest plantations, must, of course, be considered from the economic standpoint. As yet there is not enough research information available to clearly indicate the economic feasibility of fertilizing plantations for timber production.

"However, Mr. Skog feels some promising research results have been obtained. For example, he said, in a study in New York State, potash fertilization of red pine planted on worn out farm land, doubled the height growth of trees over a seven year period.

"Similar good results have been obtained from nitrogen fertilization of plantation pine growing on eroded soils in North Carolina.

"In view of encouraging results like these, and should wood products follow an expected upward trend in price, and the price of fertilization for timber production could become practical in the not too distant future."

Obituaries

Marion J. Ingram, GLF Soil Building Division, died in Baltimore after a long illness.

William K. McWilliams, 62, Mississippi Chemical Co., died suddenly May 13 in hospital, after being stricken on a business trip.

Research Results & Reports

Corn Plant "Eats" Iron Through Leaves

Corn plants can definitely take up iron from solutions applied to the leaves.

And the iron moves throughout the plant faster than sometimes thought, University of Minnesota research shows.

However, the speed of this movement depends to some extent on acidity level of the iron-containing solution.

Agricultural botanists T. W. Sudia and A. J. Linck checked corn plants with a Geiger counter 24 hours after a radio active iron solution was applied to a single leaf on each plant.

As much as 66 percent of the total amount absorbed had moved into plant parts other than the leaf where applied.

Absorption was greatest at an acidity level of pH 4.5. The term "pH" is used to show different acidity levels; a pH of 2 is highly acid, 7 is neutral (neither acid nor alkaline) and 4.5 is in between.

This rate of movement throughout the plant was greater than for two other elements studied. With radioactive phosphorus, for example, 17.6 percent was the most which had moved beyond the leaf within a day after application.

Sudia and Linck point out, however, that they studied only movement of iron and phosphorus which was actually absorbed. Proportion of solution applied to the leaf which was absorbed into the plant to begin with is still a question—and one they are studying in further research.

Fertilizer Profit Is Proved High

Farmers can lower their per pound costs of producing cotton and increase their net income substantially through proper use of fertilizer.

This was brought out at a meeting sponsored by the National Cotton Council. Dr. Niven D. Morgan of Shreveport, La., cited the following examples:

In Georgia it has been estimated that an additional 97,000 tons of 4-12-12 fertilizer and 10,400 tons of extra nitrogen would increase cotton farmers' income more than \$24,000,000 above the extra fertilizer cost.

In California on highly produc-

tive soils, the addition of \$16 worth of fertilizer reduced the production cost per pound of lint from 19 cents to 16.9 cents and the profits per acre from \$95.96 to \$149.69.

Gypsum For Sulphur Deficient Soils

It may be practical to overcome sulfur deficiency in some soils by applying such inexpensive sulphur carriers as gypsum, according to

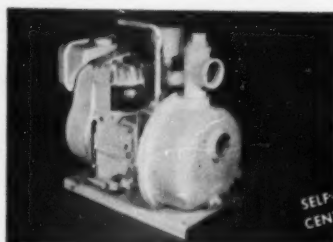
California State-USDA researchers.

The difficulty lies in selecting the proper source, rate, and frequency of sulphur fertilization for best returns. Some guides are being obtained, however, from plants growing on lysimeters in basic investigations by the California Agricultural Experiment Station and ARS on the San Joaquin Experimental Range, Calif. Long-range studies have just been completed on the fate of sul-

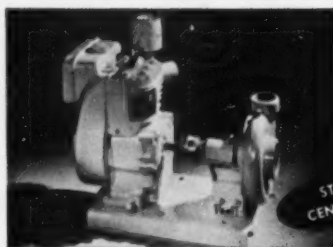


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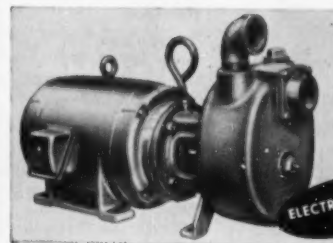
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phur applied as gypsum to an annual legume, rose clover, on Vista sandy loam. Results should be especially useful in California, where sulphur deficiency on range and dry-farmed land is widespread.

Sweet Potatoes Need Ample Potash

A lot of potash is necessary for high yields and quality of sweet potatoes. Recent research at Clemson College, in South Carolina, showed

that 209 pounds of actual potash was removed from the soil by a 365-bushel-per-acre yield of sweet potatoes.

USDA Research on Light-Sensitivity

Beltsville researchers are hotly pursuing a light-sensitive compound, contained in most plants, that is known to control plant growth from germination of seeds to coloring of fruit.

Once they can isolate and identify this elusive substance, they may be able to spray plants with chemicals

specially designed to speed up or slow down the work of the growth control compound. They may be able to breed new plant strains with made-to-order sensitivity to light. Some startling possibilities may emerge. Among them:

Superplants—including food and fiber producers—that grow several times as fast as usual.

Plants that yield fruit or flowers practically on demand.

Plants adapted to grow healthily far from their native regions. By retarding budding for several weeks until frost danger is past, or by breeding later-blooming varieties, peach trees might be safely grown in places where short growing seasons make success chancy now.

The effort to pin down the identity of the mystery compound is being pushed at the USDA research center, where the compound's existence and its effects have been uncovered in a series of experiments in recent years.

Arkansas Cotton Fertilizer Results

Cotton fertilizer experiments gave varying results at seven locations in eastern Arkansas in 1959. The tests were conducted by the University of Arkansas's Eastern Arkansas Branch Soil Testing and Research Laboratory at Marianna with co-operating area farmers.

Richard Maples and Dr. J. L. Keogh, with the Agricultural Experiment Station staff, reported the following general trends:

1. Phosphate application increased yields and advanced maturity at five of the seven sites. This tendency was most pronounced on sandy loam soils of medium fertility. Phosphate did not influence maturity and yield on one silt loam soil and on one clay loam soil, both of which tested high in phosphate.

2. Potash increased yields significantly in two experiments but not in a third test — all on soils of medium potash fertility. At one location, a heavy broadcast application of potash delayed maturity and depressed yields.

3. Nitrogen fertilization trials were included in three of the tests. In one of these tests, 60 pounds of nitrogen an acre gave highest total yields and highest yields at first picking. However, nitrogen did not significantly influence yields in the other two tests.

The program was part of a continuing series of tests designed to study response of cotton to fertilizer on soils of varying fertility levels.

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Value of Soil Tests Shown in OSC Survey

The value of soil tests was proved in Marion County, Oregon, recently when a cooperative mass sampling revealed at least one reason why crops in that area aren't growing as well as they should.

Too little boron was found in 209 of the 228 soil samples taken. Of these, 158 were critically low, reports Arthur S. King, Oregon State College extension conservation specialist.

Soils on 66 farms within a 7-mile radius of Stayton were tested as a cooperative effort of Oregon State College, fertilizer dealers and the Stayton Canning Company. The mass testing was initiated by the canning cooperative which felt that growers could improve production of some crops — especially sweet corn.

Soil samples were analyzed in the OSC soil testing laboratory. The testing service tells how much fertilizer is needed to grow a particular crop on certain soil. Each of the Marion county samples was checked for corn, beans, carrots, and strawberries.

Forty-four samples were low in phosphorus, 24 critically low. But 75 samples were real high, which reflects a heavy use of phosphorus fertilizer by some farmers who may be applying more phosphorus than they need, King observed.

As for potash, 90 samples were below the level considered adequate for most crops.

The tests uncovered a shortage of magnesium on 15 samples. This was the first indication of magnesium shortages in the main Willamette Valley.

Dr. King pointed out that taking many samples in a concentrated area provides good opportunity to compare soils and see what shortages are present in the area.

Data Growing On Lime Use

We hear a good deal these days about the virtues of liming acid soils, but the subject is far from being exhausted. Agricultural college agronomists are steadily developing additional information on the benefits of lime.

As an example of this, here is a statement by Clinton Hoover, University of Nebraska extension agronomist listing five major dividends

that come from liming acid soils:

1—Lime helps make available from the soil greater amounts of phosphate, potash, magnesium and other elements.

2—Lime increases forage yields and promotes stronger, thicker legume growth.

3—Lime helps increase the efficiency of the fertilizer you apply to non-legume crops. It reduces the solubility of certain harmful chemicals. It improves the feed value and quality of crops.

4—It stimulates the growth of beneficial soil bacteria and speeds up the decay of organic matter. It helps release available nitrogen to the soil for plant use.

5—The use of lime helps improve soil structure and tilth. It increases the intake of moisture, provides better soil aeration and decreases runoff and losses of topsoil and water.

Mr. Hoover says lime should be applied according to soil test information. He points out that you can lime acid soils anytime during the year and anytime during the cropping sequence. Lime does its best job with legumes when it is applied six months to a year ahead of seeding, Mr. Hoover reports.

Suit Corn Population To Soil Fertility Level

It pays to suit your corn plant population to the soil's fertility level, reports the National Plant Food Institute's Midwest division.

"You get maximum efficiency from fertilizer when you have a good stand of corn," says the Institute in citing studies by Dr. Gordon Ryder, Ohio State University extension agronomist.

In Minnesota tests corn yields were increased about 26 bushels per acre with a stand running 16,000 to 18,000 stalks per acre, when sufficient fertilizer was added to feed the crop.

Minnesota soils specialists say: "If you plant a large population it is profitable to add heavy amounts of fertilizer. On the other hand it is unprofitable to have a small plant population with heavy applications of fertilizer or a large population with insufficient amounts of plant food.

"In addition to fertilizer, you need to use improved tillage and management methods. Also, you need to plant a hardy, early maturing, high yielding hybrid and to control weeds, diseases and insects."

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The International Scene

AUSTRIA

Report of good production increases

Technical development is credited for the fact that most Austrian chemical industry reports nice gains for last year, despite the market situation. Fertilizers rose from 852,000 to 919,000 tons.

INDIA

Bids invited for plant

Until September 30, bids are invited for the supply and erection of a fertilizer plant at Hydrabad, for the government of Andhra Pradesh. The documents are available on loan from the Trade Development Division, Bureau of Foreign Commerce, U. S. Commerce Department, Washington 25, D.C.

ITALY

Potash problem is solved

Montecatini's chairman and managing director, Dr. Carlo Faina is quoted in London as saying the Italian potash problem may be regarded as definitely resolved, with the completion of the huge Campofran-

co plant, which is geared to 3000 daily tons of kainite material, and is already producing schoenite and potassium sulphate to feed to complex fertilizer complex.

KOREA

Co-ops to handle distribution

Beginning August 1 the National Association of Agricultural Cooperatives will be responsible for handling government fertilizers into distribution. These co-ops and government-licensed fertilizer dealers will also be eligible to bid on Choongjoo surplus, whenever that plant's stockpile reaches 1000 tons. Currently the plant has on hand more than 2000 tons of urea. Public sales will be held with only the two groups named being eligible to bid.

PAKISTAN

Buys superphosphate from Tunisia

For the first time in Pakistan history, superphosphate will be shipped from a Muslim country—8,000 tons of triple superphosphate are on the way to Chittagong. Pakistan

has imported since 1952 some six million tons of fertilizers with a value of 9.73 crores. (see Tunisia, below)

SOUTH AFRICA

Fertilizer use concentrated

In the heart of the area which consumes two-thirds of the fertilizer applied in South Africa—the Orange Free State and the Transvaal—the \$7,000,000 fertilizer plant recently built has a capacity of 200,000 annual tons of superphosphate, 112,000 of granular grades and 75,000 of sulphuric acid.

TUNISIA

Phosphate rock declines 4%

Production of phosphate rock in Tunisia declined 4 percent to 2,184,591 metric tons in 1959. Of the total, 1,816,300 tons were exported, 100,344 tons were converted to crushed (Hyper Reno) phosphate, and 334,792 tons were consumed in manufacturing superphosphates. Both normal (16 percent P_2O_5) and triple (45 percent P_2O_5) superphosphates are produced; 1959 output was 123,690 tons of triple superphosphate and 30,000 tons of normal superphosphate.

UNITED KINGDOM

Prices coming down

Imperial Chemical Industries is reducing the prices of all its fertilizers from July 1. The reductions will represent a saving to British agriculture of not far short of £1m. in 1960-61.

The reductions are based partly on increased sales in the 1959-60 season and the company's confidence in the expanding use of fertilizers in the coming year, and partly on improving methods of production and the advantages accruing from operating I.C.I.'s new fertilizer plants at higher rates of output.

None of the raw materials is expected to be cheaper in 1960-61, and labour costs are unlikely to fall.

Price cuts range from £1 to 5s per ton throughout the season 1960-61.

Production and consumption of fertilizers in the Commonwealth rose by 32 and 47 per cent, respectively between 1950 and 1958 whereas in the world as a whole production and consumption rose by 77 per cent.

This is pointed out by the Commonwealth Economic Committee in its report, Fertilisers in the Com-

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Consultations between the Board of Trade on the one hand and Imperial Chemical Industries, Fisons and other large buyers of potash on the other have led the view that the balance of advantage lies against closer integration of purchasing arrangements by the U. K. companies concerned.

Western Germany and Spain are Britain's largest suppliers of potash, followed by Eastern Germany, and with smaller amounts coming from more distant sources. Western Germany and Spain have a common selling agent in Britain, Potash Ltd., which is a subsidiary of those countries' producing groups. All the supplies bought by U.K. companies are acquired through Potash.

WEST GERMANY

Kali-Chemie sales up 15%

Kali-Chemie A.G., the largest potash manufacturer in West Germany increased sales last year by 15 per cent to 205 million marks (about \$50 million), the company stated. A fourth of the total was exported.

Cyanamid Finds Pollution Control Pays

American Cyanamid Company has found that an air pollution monitoring system begun five years ago at its Brewster, Florida, phosphate plant has been an indispensable tool in determining control measures necessary for maximum production without air pollution. Additionally, the project has helped improve the plant's community relations.

So reported Charles R. McHenry, an industrial hygienist in Cyanamid's central medical department, in a paper delivered to members of the Air Pollution Control Association at its annual convention.

Cyanamid's comprehensive monitoring program is regarded as the most extensive undertaken in the phosphate industry. For example, in carrying on atmospheric sampling, four continuous and dynamic sampling stations and 18 static sampling stations are located at distances up to 20 miles from the plant, Mr. McHenry reported. A complete meteorological monitoring station was also set up.

Cyanamid to date has spent more than \$1,400,000 in studying and effecting air pollution control, it was stated.

Participating in the Brewster monitoring program with McHenry are Hoyt Charles, agriculturist; Dr. W. A. Rye, plant physician; and Arthur Crago, plant manager.

Du Pont Offers New Ammoniating Solution

A new ammoniating solution that promises premium quality conditioning of pulverized mixed fertilizers is now being offered by the Du Pont Company. Called Du Pont "Uramon" Ammonia Liquor-K (UAL-K), the new solution contains 40 per cent nitrogen. The conditioning advantages are provided by methylene ureas which minimize bag caking and improve handling properties on the farm.

Successful commercial trials with large quantities of pulverized 5-10-10 this past year have demonstrated the practical value of this new prod-

uct. Other advantages of the new solution are the cooling effect of ammonium carbamate, relatively low gauge pressure, and low corrosion characteristics. In addition to pulverized mixtures, it also can be used for making granulated mixtures with more uniform granules.

The new solution brings to four the number of "Uramon" Ammonia Liquor ammoniating solutions offered by Du Pont—UAL-B and UAL-S are general purpose solutions, and UAL-37 is a specialty solution, containing 37 per cent nitrogen which provides significant quantities of long-feeding nitrogen for crops.

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Huge New Mills for Cyanamid at Brewster

American Cyanamid Company has just taken delivery at its Brewster, Florida triple superphosphate works on two of the largest machines of their kind ever to be built.

The two giant mills, designed and built by The A. J. Sackett & Sons Company of Baltimore, Md., and designated as No. 150CB* Hammerhead Mills, will reduce the size of triple superphosphate lumps en route to storage for curing. The units will be installed during the

summer and are expected to be fully operational during September.

This installation is a part of Cyanamid's overall air pollution control program (see page 61 for related story on this program), and will greatly reduce the emission of fluorides from the triple superphosphate storage building.

Cyanamid's triple super is manufactured in TVA-type cone mixers with continuous dens. The product is excavated from the endless belt by a regular disintegrator, and fed by belt conveyors to storage piles

for a three to four week curing period.

The new mills are being installed at a point where they will take the product off the two belts leading from the dens. They will further break up the lumps of 'green' triple superphosphate to allow removal of entrapped fluoride gases which are evolved following acidulation of the rock.

The effluent will be collected at the mills and fed into cyclonic water-scrubbers fabricated by Automotive Rubber Co., for removal of

* U. S. and Foreign Patents Pending

the gases from the exhaust. From the mills, the crushed triple superphosphate will continue by belt conveyor to the curing building.

Some idea of the relative size of these two huge machines can be gained from the photographs. Pictured alongside the big mills is one of Sackett's comparatively-small No. 15CB Hammerhead Mills, the size used by many granular fertilizer manufacturers to crush oversize particles from their classification screens.

Constructed of heavy steel plate, the giant mills have rotors mounted on piston ring-sealed oversize Timken Tapered Roller Bearings. Each mill has an overall height of 14 feet, width of 9 feet, depth of 12 feet and actual weight of 24,000 pounds, without drive. Each will be powered with a 200-horsepower motor. The main inspection doors, located on top of these mills, are opened and closed by pneumatic cylinders equipped with machine-mounted controls.

Photograph on opposite page shows one of the giant mills with air cylinder and support in place.

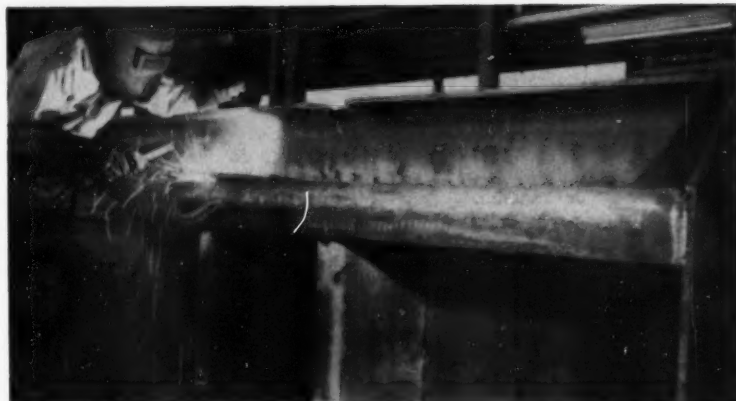
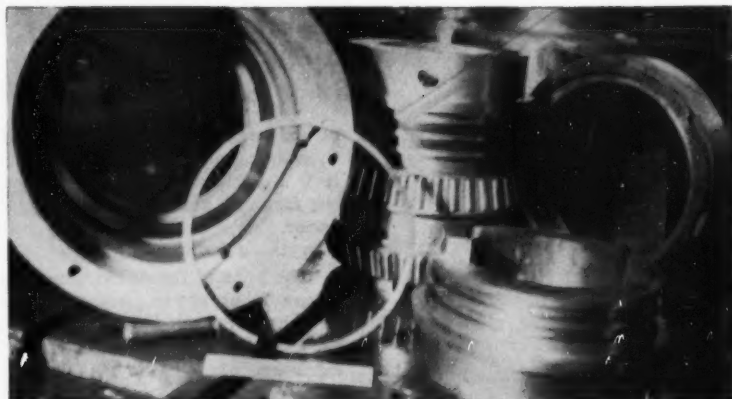
Photograph below shows the size of one of the giant mills as compared to the normal size one being presently used by the fertilizer industry.

Photograph at top right illustrates roller bearing parts before assembly. Size of parts can be compared with 6" scale shown in foreground.

Next photograph is close-up of mill showing 532-pound Sackett Timken pillow block in place.

Next photograph shows welding of mill base assembly.

Photograph at lower right shows mill in more advanced stage of fabrication.



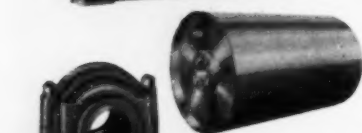


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NPFI Convention Report

(Continued from page 32)

of all, this dealership must be larger than the farmer he is serving. Today, it is big business, big government, big farmers, big society, and big finance. This dealership must have everything for the buyers needs.

"The head of the dealership of the future must have leadership capacity, honesty, be active in civic affairs, and above all, he must be a salesman. This 'boss man' must be enthusiastic.

"Beyond the human element, the physical assets play an important role in the successful dealership. He must have a modern place of business, clean, well displayed merchandise of the highest quality, and a variety of products to service the buying public's needs."

Ralph Everett, of Miami, Fla., prominent sales consultant, told the convention Insitute here today that "the leaders of the fertilizer industry during the next ten years will have demonstrated and proven one simple truth—you don't sell fertilizer, you sell a mental concept of how the farmer can benefit from your soil fertility plan."

"A prospective buyer will pay you untold sums of money for good ideas and not one red cent for the product you have to sell," he continued. "What he buys, in reality, is not the product you sell but a mental concept of what your product will do for him. Will it make him happier? Will it save him time? Will it make him more popular? Will it save him embarrassment? Will it make him more efficient? Will he be recognized as an authority?"

"You don't sell fertilizer," he emphasized, "you sell mental concepts of what your prospect can get from the use of your fertilizer in the form of a soil fertility program."

Mr. Everett said that "many farm leaders have awakened to the value of fertilizer and what a good soil fertility plan can mean to them. Around every community are certain farm leaders who can understand the value of such a soil fertility plan. These farm leaders are using enough fertilizer to justify this kind of service." He emphasized that he knew of no better way of convincing and motivating farmers than for dealers or salesmen "to earn 100 per cent of his purchases through the presentation and application of a soil fertility plan."

"Probably no industry has prepar-

ed its salesmen with more technical knowledge than has the fertilizer industry," he said. "Fertilizer salesmen are more thoroughly grounded in the chemical composition of their product and the technical aspects of their business than any other sales force in history. Probably no industry has spent so much time indoctrinating their salesmen in the technicalities of their product than has the fertilizer industry. Technical experts working for fertilizer manufacturers have done their job well.

"All too frequently, the sales presentations which I have heard fertilizer dealers and salesmen present have been so full of technical 'nuts and bolts' that barriers of confusion and indecision have obscured the mental pathway to comprehension and motivation in the prospect's mind. Nearly always these barriers have been placed there unintentionally because of improper understanding of how a sale is actually made.

"Please don't misunderstand me. I am not saying that salesmen and dealers should not know their product. This is the first step in learning how to sell anything. Unfortunately, however, 95 per cent or more of the sales effort has been on the technical features of the product and 5 per cent or less on the human element of making a sale."

He said that farmers are "longing for the fertilizer salesmen who can picture his problems, his investments, his ambitions, his goals in life," adding that salesmen who will trouble themselves to learn the processes that go on in the farmer's mind "will have a gold mine that will produce in direct proportion to the work he wants to put in."

In summary, Mr. Everett called for a thorough four-point sales and follow-through program spanning almost the entire year. The salesman should make a preliminary survey, then personal planting recommendations; he should maintain contact through inspection-consultation reports during the growing season, and finally make a proof-results check at harvest time.

Housebroken Manure New West Coast Process

A dairyman named Phil Raven in Selma, Cal., together with his sons, has come up with a 3-phase process that liquidizes, gents and deodorizes fresh steer manure—for use on house plants.

STATES POST CHANGES IN GRADE LISTS

Virginia Makes Changes in 1960-61 Grade List

The Virginia Fertilizer Grade Committee meeting June 3, made a number of changes in the fertilizer grades approved for sale in the state during the year beginning July 1, 1960.

Under the 0-1-1 ratio, 0-20-20 and 0-30-30 were dropped and 0-25-25 was added as a substitute for both. 0-14-14 was continued on the grade list under this ratio, however.

Under the 0-1-2 ratio, 0-10-20 remains as the minimum analysis but 0-20-40 was dropped in favor of 0-18-36.

In the 0-2-1 ratio 0-20-10 and 0-40-20 were both discontinued and 0-30-15 was added in their place.

10-20-10 was eliminated due to small demand, with 5-10-5 held as the only 1-2-1 ratio on the new list.

12-6-6 was added as the only grade under the new 2-1-1 ratio which will be recommended by the state's Agricultural Extension Service for turf fertilization.

Under the 'starter solution and foliar spray grades' 18-46-5 and 12-48-6 were added while 10-52-17

was deleted because of 'no interest for registration.'

The Board pointed out that 0-30-30, 0-20-40 and 0-40-20 were deleted because available supplies of calcium metaphosphate are expected to be reduced materially in the next few years and because manufacturing problems have increased with these grades, especially when borax and pesticide materials are added.

Registrants or manufacturers are permitted to dispose of present warehouse inventories of deleted grades through December 31. While registration is not required for these discontinued grades sold through the remainder of the year, tonnage reports and inspection fee payments are necessary.

N.C. Adds Three Grades, Drops Three from List

Meeting at Raleigh June 1, the North Carolina Board of Agriculture made several changes in fertilizer grades eligible for registration in the state during the year beginning July 1 1960.

0-25-25 has replaced 0-20-20 on the new list; 0-14-14 and 0-30-30 are the other two 0-1-1 ratio grades eligible for 1960-61.

10-20-10 has been dropped from the 1-2-1 ratio leaving 6-12-6 as the only grade remaining under this ratio.

The 1-3-2 ratio, which contained only a 4-12-8 grade last year, has been eliminated from the list altogether.

New in the 1-3-3 ratio classification is 4-12-12; no general crop fertilizers were offered in this ratio for 1959-60.

A new ratio, 2-1-1, appears on the list this year with 12-6-6 as the only grade eligible for registration.

All the grade and ratio changes affected grades for general crops only, and no changes at all were made in the grades eligible for registration as tobacco or fish pond fertilizers.

S.C. Adds Two Ratios, Reinstates 4-10-6

South Carolina has added two new ratios to the list of fertilizer ratios acceptable for registration in the state during the year beginning July 1, 1960.

One new ratio is 1-3-2, with 4-12-8 as the minimum grade eligible for registration, and 3-1-0 is the other

CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

STATE	May		April		Jan.-Mar. Qtr.		July-December		January-June		YEAR (July-June)	
	1960	1959	1960	1959	1960	1959	1959	1958	1959	1958	1958-59	1957-58
Alabama	-----	165,927*	350,718	313,727	256,322	296,745	180,959	199,250	846,309	734,077	1,045,574	906,798
Arkansas	35,752	42,602	126,184	95,420	99,521	113,772	58,714	63,767	289,365	226,889	353,132	289,641
Georgia	414,392	471,260	306,864	253,371	154,787	175,293	297,138	294,751	1,130,998	944,618	1,425,749	1,214,147
Kentucky	-----	150,782*	144,047	130,518	137,502	176,106	108,734	99,460	491,920	435,023	583,281	523,794
Louisiana	44,488	45,047	76,347	56,162	73,649	79,260	66,744	64,152	201,642	188,409	265,794	252,601
Missouri	-----	155,892*	196,241	175,215	81,573	165,375	272,014	362,437	563,055	420,615	926,111	755,927
N. Carolina	-----	282,240*	571,328	464,818	393,130	625,933	175,533	228,055	1,468,704	1,261,685	1,696,759	1,461,131
Oklahoma	17,164	14,374	24,349	15,936	19,523	25,801	72,511	68,848	64,738	55,594	133,586	107,400
S. Carolina	96,255	102,425	262,096	220,685	267,217	385,472	104,903	134,202	756,100	615,733	890,302	732,607
Tennessee	114,932	112,907	193,816	151,177	126,524	150,897	117,275	127,116	443,602	307,182	570,718	442,899
Texas	80,575	83,994	108,583	78,651	192,926	213,084	233,410	222,800	441,851	452,327	664,651	666,128
California	(reports compiled quarterly)				350,259	317,589	457,956	453,800	803,261	679,577	1,254,028	1,121,546
Mississippi	(reports compiled quarterly)				170,706	207,139	142,576	176,371	516,917	472,791	693,288	641,262
Virginia	(reports compiled quarterly)				221,511	315,665	141,177	160,178	618,965	549,773	779,143	690,556
Indiana	(reports compiled semi-annually)						321,956	316,341	856,316	795,506	1,172,657	1,080,465
New Hampshire	(reports compiled semi-annually)						-----	4,746*	16,143	16,053	20,889	20,019
TOTAL	803,558	872,619	2,360,753	1,955,680	2,545,277	3,248,131	2,751,603	3,147,899	9,509,886	8,155,852	12,475,662	10,906,901

(not yet reported)

* Omitted from column total to allow comparison with same period of current year.

new ratio acceptable in a minimum grade of 30-10-0.

The 2-5-3 ratio, which did not appear on the initial list last year, but was re-admitted during the year, has also been reinstated this year in a minimum grade of 4-10-6.

Higher-analysis multiples containing more plant food than minimum grades in any approved ratio are permissible in South Carolina.

Mississippi's Changes In Approved Ratios

Mississippi's list of ratios and minimum grades of fertilizers acceptable for registration and sale during the year beginning July 1, 1960 shows minor changes from the 1959-60 list.

The minimum grade acceptable under the 1-4-4 ratio has been lowered from 6-24-24 to 3-12-12 and a ratio of 4-10-7 with a 4-10-7 minimum grade has been granted a one-year-only approval.

In addition the new list contains the following P-K ratios and minimum grades: 0-1-1 (0-14-14); 0-2-1 (0-16-8); 0-1-2 (0-12-24); and 0-1-3 (0-10-30).

Dropped from this year's list of approved ratios were 1-3-3 with a minimum grade of 4-12-12, and 2-1-1 with a minimum grade of 12-6-6. Also eliminated from the list of approved materials were the 25% potash salts eligible for registration last year.

Arkansas Board Changes Grade List

Meeting June 24, the Arkansas State Plant Board made some changes in the list of approved ratios and grades of mixed fertilizers that may be sold in that state during the year beginning July 1, 1960.

The Board added a new ratio, 0-2-1, with a minimum grade of 0-20-10, to the list for the coming year. It also increased the minimum grade in the 2-1-1 ratio from 12-6-6 to 14-7-7.

It continued to list the 1-3-6 and 2-3-9 ratios, with respective minimum grades of 3-9-18 and 6-9-27, as approved but 'not recommended' from an agronomic standpoint, and stated they may be deleted at some time in the future.

In another action, the Board classified "ammonium phosphates, etc. (10-20-0, 16-20-0, etc.)" as fertilizer 'materials' with no ratio and grade restrictions applicable. However the Board suggested that this area be studied and that consideration be given at the next hearing to limiting these materials to a minimum content of 24 units of plant food.

Urea Pricing Policy Changed by Allied

Effective July 1, all agricultural and industrial grades of urea will be priced F.O.B. production points rather than on a delivered price basis, it was announced by Malcolm E. Hunter, sales vice president for Allied Chemical's Nitrogen Division.

He explained the change in pricing policy would improve the division's marketing services to customers. Previously, Nitrogen's urea was sold on a delivered price basis.

F.O.B. points will be South Point, Ohio and La Platte, Neb. Under the new pricing, delivered cost will be equalized against competitive producing plants.

The division will continue to ship from warehouse stocks with freight charges equalized on the basis of quantity per shipment.

Authors Correct Error In May Article Tables

In the article titled 'Cost of Producing Liquid and Solid Mixed Fertilizers' in our May 1960 issue, the delivered costs of urea-ammonium nitrate solution presented in Table 3, and used in the calculations in Table 4, were in error. The costs were based on an f.o.b. price of \$1.28 per unit of nitrogen rather than the correct value of \$1.60 per unit of nitrogen, the authors tell us.

Using the correct value, total costs of producing the liquid fertilizers as presented would be increased by about 1.5 percent for grades with $N:P_2O_5$ ratios of 1 to 2, about 3 percent for grades with $N:P_2O_5$ ratios of 1 to 1.33, and about 4.5 percent for grades with $N:P_2O_5$ ratios of 1 to 1. The cost of producing liquids with $N:P_2O_5$ ratios of 1 to 3 would not be altered since urea-ammonium nitrate solution is not required in these formulations.

Potash Deliveries Down During First Quarter

Deliveries of potash for agricultural purposes in the United States, Canada, Cuba, Puerto Rico, and Hawaii by the eight principal American producers totaled 860,759 tons of salts containing an equivalent of 499,593 tons K_2O during the first three months of 1960, according to the American Potash Institute. This was a decrease of 4% in salts and K_2O under the same period in 1959. Continental United States took 474,666 tons K_2O , Canada, 18,106 tons, Cuba, 1,737 tons, Puerto Rico, 722 tons, and Hawaii, 4,362 tons K_2O . Exports to other countries were 121,241 tons K_2O , an increase of 104%.

Deliveries of potash for non-agricultural purposes for the first quarter amounted to 38,386 tons K_2O , an increase of 6% over last year.

Total deliveries for all purposes were 1,123,342 tons of salts containing an equivalent of 659,220 tons K_2O , an increase of over 6% in salts and K_2O over the first quarter of 1959.

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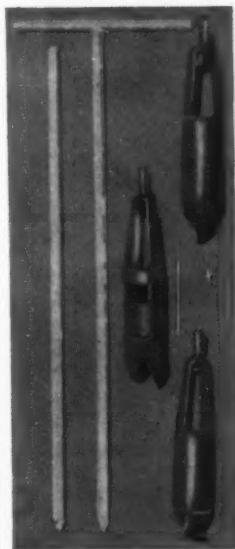
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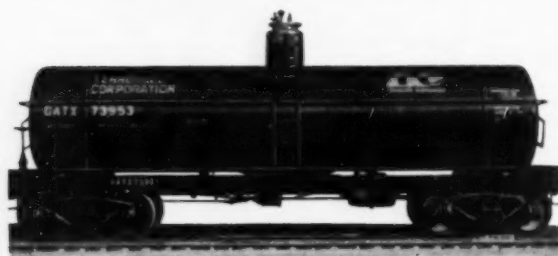
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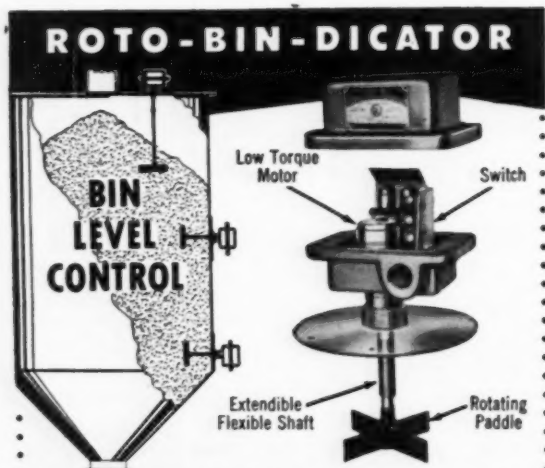
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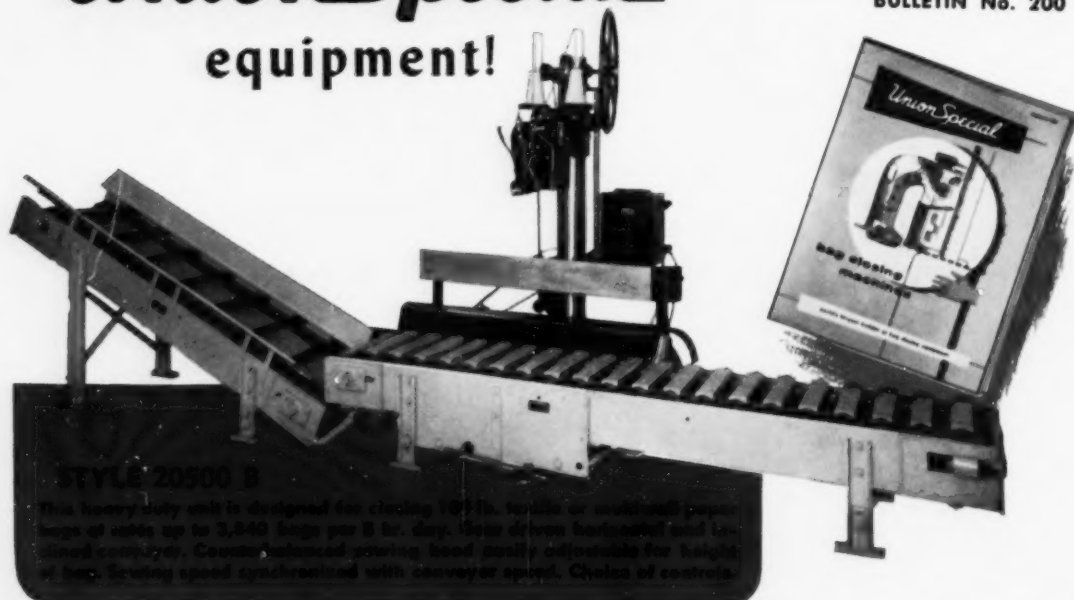
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